

HOTTEST OFF-ROADERS FOR '89

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December

1988

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Radio Control CAR ACTION

THE WORLD'S PREMIER R/C CAR MAGAZINE

Canada \$3.75

OFF-ROAD THUNDER!

WILD MONSTER TRUCK PULL!

KILLER 4WD

SHOOTOUT

Schumacher Cat—Turbo Optima Mid—Yokomo C4—Avante WHICH RULES!



Trick Airbrush Techniques



RC10 Belt Conversion



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OFF-ROAD THUNDER!

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ON THE COVER: Top: California Neon stripes. Truck airbrushing by von Erich. Kyosho Baja Bugs and 8-year-old BMX freak Tom Murphy sharing the dirt. Photo by Walter Sidas. Top Center: '41 Willys Tug-a-War doing its thing at the Bay City Truck Pull. Photo by Rich Hemstreet. Center Right: Kyosho Shadow and Tamiya Boomerang. Center Left: The 4WD big boys ready for battle. Bottom: '57 Chevy drag car—Rug Rat II by von Erich.

EDITORIAL

by CHRIS CHIANELLI



OFF-ROADING IS STILL the most popular segment of R/C racing, and it seems as though you bug-eyed competitive types are hopelessly addicted to the dirt arena where mercy has no place. Well, as promised (and who would *dare* break a promise to the devout followers of the dust?) here's RCCA's second annual Off-Road Special, spearheaded by the shootout of the century between the Schumacher Cat, the Kyosho Optima Mid SE, the Yokomo C4 and the Tamiya Avante. And, in the spirit of our Budget series, and especially for you newcomers who aren't ready to go for high-ticket machines, the moderately priced Tamiya Boomerang and the Kyosho Shadow meet for a duel in the dirt. Also in this issue, Steve "Smitty" Pond brings you Part I of the new Hyperdrive belt system for off-road use, and Jeff Palmer tells us what many racers are now successfully using for off-roading. And let's welcome Bill O'Brien on board with his track report on the Optima Mid SE, and our resident Hippocratic oath-taker, Dr. Joe Bruni, takes a look at MRP's American-made 4WD Shotgun. If that's not enough for you full-blown dirt junkies, all I can say is *too bad; bye bye!*

WARNING! The Ayatollah of Radio Controlla has decreed that any off-roader caught running an enduro race without his or her emergency survival can of Dinki Di condemned meat will be severely penalized. The penalty will be banishment to the Kingdom of Boredom where only our competitors' car magazines can be had, or, even worse, you'll be relegated to read the geriatric R/C journal, *RCM!*

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Letters

WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Letters" Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, Illinois; other mail addressed there must be forwarded to Connecticut, which leads to long delays.

Striker Cracks

I really enjoy your magazine and remote-control cars. Right now, I own a Tamiya Striker and I'm having problems with it. I'd like to know why its chassis always cracks? I thought it might be the suspension, so I got oil-damper shocks for the back, but I can't find a set to fit the front! Please help!

ADAM MICHELIN
Little Neck, NY

Adam, you're not the only one who has stress-cracking problems with the Striker. I don't know if MRC/Tamiya is correcting

the problem, but I'm sure the CRP part No. 1558 oil-filled shock we used on the Futaba FX-10 will fit the Striker, since they're similar cars.

CC

Calling all Women

Thank you for printing my request to hear from other women $\frac{1}{4}$ -scale car owners, but I didn't include my mailing address for responses. If you can still help me, my business address is:

FRENACEE COLEMAN
c/o Danny's $\frac{1}{4}$ -Scale Race Cars
10462 "B" Trask Ave.
Garden Grove, CA 92643

Resourceful

I'm a proud owner of a Kyosho Ultima with one slight problem: The Ultima doesn't have much of a front wheel selection because of the thin front axles. Your May '88 issue mentioned that Hot Trick has replacement front axles to enable the Ultima to run with any of the

many wheels made by Tamiya. This would have cost me 11 bucks. Instead, I went to my local hobby shop and got some brass tubing for 40 cents. Now I can run with Tamiya wheels.

Your magazines are awesome.

TODD FIRESTINE
North Plainfield, NJ

Todd, I'm sure other Ultima owners will not only find your idea useful, but will also be grateful for the \$10.60 savings. Money-saving ideas such as this are always welcome.

CC

One for Mrs. Rodgers

As a parent, I agree with Mrs. Rodgers that the ad using the sketch of the girl in the briefest of bikinis was not suitable.

My son has been enthralled with your magazine since he was 10, and we feel this picture degrades the super concept you strive for in R/C Car Action. Too



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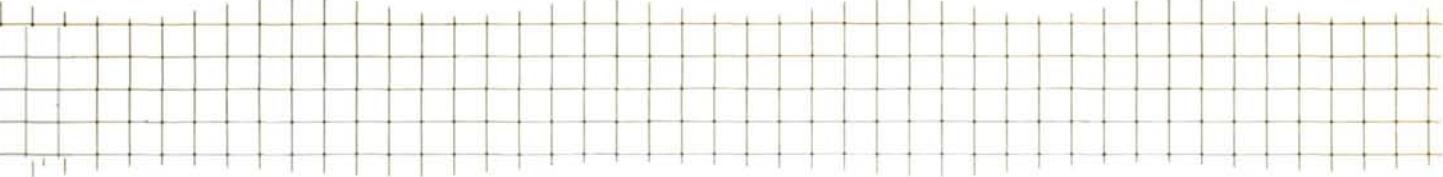
fun go off.

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bad the sketch wasn't redesigned especially for your publication.

KAREN RIVET
Edmonton, Alta, Canada

Saving Stock

There has been an unprecedented response to Mr. Provetti's "Advanced Out of Existence" letter (Sept '88 issue). Due to the lack of action on the part of the powers that be, we felt it not only appropriate, but also necessary, to print these letters. It's time for organizations like ROAR to take action before the young stock-class racers start throwing in the towel. This is definitely not what we want. If no action is taken, it could cripple the hobby. Here are some of the letters we received. What's your opinion? We need to know.

CC

Mr. Provetti's letter on stock motors came at an opportune time, as I have just come from competing in the ROAR

Region 3 Stock Class race in Grand Rapids, MI. Take it from me, stock-class racing is in name only.

This was my first regional race and I got a few surprises. ROAR's Region 3 director (who also happens to be the administrator for ROAR), pitted next to me. When I was getting ready for the first qualifiers, he and some friends started dyno-testing their motors. I wondered why they would need a dyno to test a stock motor. I soon found out when the motor came to life. It screamed like a modified motor. I was really impressed, so I walked over for a closer look. That motor was turning over 25,000rpm! They were really excited about that. Then they tried another motor. That one went over 30,000 rpm! I asked how they were getting that many rpm, and if it was illegal.

The ROAR director/administrator said they'd better not be doing anything illegal. They never would tell what they

did, but I was now curious and had to know, since I was racing against them. I found that almost every racer was advancing the timing of the commutator in relation to the armature. This would make the motor draw more amps and boost the rpm. I thought that the only changes to a stock motor could be to the brushes and springs. Later in the day, I saw the ROAR director/administrator and asked him if this was legal. He said you can do anything to the motor except take it apart, and anyway, how we can tell if a motor has been advanced? That was a big surprise to me, since I thought these type of races determined who was the best driver when all cars had the same motors. But if you can make almost any modification to the stock motors, then why have "stock-class" racers?

(Continued on page 10)



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Letters

(Continued from page 9)

Something should be done to eliminate motor tampering or to enforce the rules that are in the ROAR membership manual. ROAR says all stock motors can only have 27 turns of 22-gauge wire and nothing on timing. If timing is so important that it will make a motor run faster, then a limit should be put on timing also.

KEITH POWELL
So. Holland, IL

I'm in full agreement with the letter from Ernest Provetti. All these new, hot, stock motors are ruining R/C racing in general. A large number of drivers who had been running in the open class are now running stock. Consequently, all these hot-dog drivers are driving circles around the drivers who've been running stock and weren't ready to run open yet. Furthermore, the drivers who just moved up to stock from novice feel that now they don't have a chance at all. I've noticed that a large number of these stock drivers have quit racing altogether.

Two-and-a-half years ago, when I started racing, all the stock motors were just about the same. Back then, everyone had a good chance of winning. It was a matter of who could stay out of trouble and find the best line around the track to win.

If we are to maintain interest in R/C racing, some kind of control had better be put on the stock motor.

PHILIP HERBACH
Portland, OR

I must agree with Ernest Provetti. In the stock classes of major races, being successful means having a generous sponsor. Stock class should really be a test of driving skill.

Thanks very much.

ALLAN WILLE
*President, Autotech
Oakville, Ont., Canada*

Mr. Provetti's comparison of Group 7 slot-car racing and stock R/C motors isn't a fair one. However, I do agree that there should be a uniform timing agreement between the importers. As a dealer and local racer, I see the "current" stock motor change week to week and the life span drop off accordingly. As a dealer,

I'll order and sell whatever my clientele want. As a racer, I would like to be able to race competitively each week without having to buy a new motor.

I don't have the answer for Mr. Provetti, but I hope that his plea will be addressed in a timely manner. The stock class is the proving ground for most people who enjoy a close wheel-to-wheel race at an affordable price. Let's keep it that way.

RICK BLOUIN
*Zelman's Hobbies
Fairfax, VA*

I just read Mr. Provetti's letter, and I strongly agree with what he says. A stock motor should be just that—stock. Let's quit trying to get as much advancing out of these motors as we can and maybe get them a little closer to stock. A big thanks to Mr. Provetti for speaking up on this issue—especially since he's a manufacturer.

STEVE CARLETON
Leduc, Alberta, Canada

I'm 15 years old and I agree totally with Mr. Provetti about stock motor timing. I used to run two-wheel and four-wheel stock. I bought a Trinity stock motor and ran well with it for almost two seasons! I purchased a new stock motor. The motor ended its life after three races even though I cleaned it. My friend has the same motor and his went bad after five on-road races. I got tired of buying stock motors and went to Modified Class, which has yet to retire a motor. If something isn't done about this, a lot of racers will quit, because if they want to compete in the A-Main, they have to buy a new motor every few races.

Your mag is number one!

TODD CLAYTON
Dublin, VA

As the race director of a local hobby shop, I have to stay on top of all the rules and specifications regarding the races. I felt compelled to write after getting a bellyful of complaints by racers about the stupidity of ROAR rules. Being a former ROAR member (and I will not renew my membership), I am in almost total agreement with the complaints of

(Continued on page 12)

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(Continued from page 10)

my regular racers.

First of all, there's the stock motor problem. Factory teams get special motors and equipment for racing. I know racing is a major part of R&D, but these guys should be in a separate class. If it's not available, as is, to the public, it shouldn't be run.

ROAR rules state in Section A-1 that their purpose is to promote R/C racing as a "family oriented" sport. It seems to me (and I speak for the majority of the racers at my track—members of ROAR and non-members), the only way to do this is not to have anyone associated with, or belonging to, any manufacturing company on the rules committee or holding any office of this "organization." The sport/hobby is too big and popular to have the manufacturers make the rules suit *their* needs.

R/C modelers, I urge you to speak up on how you feel about our hobby/sport. This is for *your* enjoyment, not the personal whims of a handful of fat-cat manufacturers.

Our sport is turning into a money game, and it will die like slot cars did, if we don't act now.

RUSS WINN

Ernie Stikes Back

Here's the one and only letter disagreeing with Mr. Provetti.

In response to Mr. Provetti's letter, I must say...WHY? Why not advance the timing on stock motors. He talks about keeping the races fair, competitive and alive—but what about good old competition in the motors game?

Whatever his reasons for condemning the advancement of the timing on stock motors, he's dead wrong. With every degree you increase the timing on the motor to get more speed out of it, you decrease your run time. Of course, if you advance the timing *and* use some of Trinity's 1700mAh cells (which I am sure Mr. Provetti has no qualms about) then you will lose practically no run time and still get the added speed from advancing the timing. What's "unfair" is battery wars and battery favoritism to team drivers, etc.

I probably won't get a reply to this, as it goes against the tide, but I gave it a shot and hope that RCCA won't be

biased towards Trinity.

ANGELOS KARAGELIDIS

Dedham, MA

Angelos, rest assured, RCCA's loyalty is to the reader, and it appears that they all feel you're dead wrong. The voice of the people has been heard; now, here's the reply you thought, and probably hoped, you'd never get.

CC

As the old cliché goes, "There's one in every crowd." Frankly, I'm trying to understand your position and I am at a crossroads: Either you're a disgruntled manufacturer writing under an assumed name, or you've never run a stock motor in any type of competitive racing.

Your argument on trade-offs (more timing costs battery life) is almost laughable. Battery duration is not a problem in stock racing, regardless of the timing. If you knew anything about racing, you'd realize that everyone uses Sanyo SCR batteries in Stock, and these have the lowest capacity rating (run time) and the most voltage output. Why? Because once again, stock racing is predicated on how fast you can go and this is dead wrong. We need limits on technology.

If your argument of letting people run what they want, with no limits, were applied to NASCAR or CART, you'd have people going 300mph around an oval, killing themselves every second turn. You're also playing right into the hands of the people you object to: Trinity and companies like us. If you want to put stock racing into the hands of all-out speed demons with no budgets and let people spend whatever they want to go fast, then you'll have one or two manufacturers owning the hobby like you do in Modified Class. It's like the Yugo Team in CART competing against Penske.

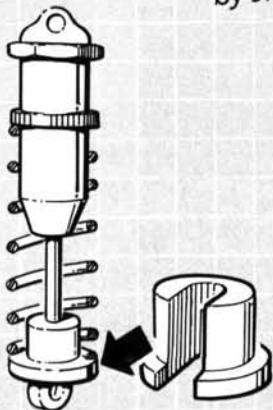
In closing, let me just wish you the very best of luck with your racing on Pluto, and we won't hold you any longer; I'm sure you have to head down to your local hobby shop to buy seven or 10 more stock motors.

ERNEST N. PROVETTI
President, Trinity Products, Inc.

We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, due to the tremendous number of letters we receive, we cannot respond to every one.

Pit Tips

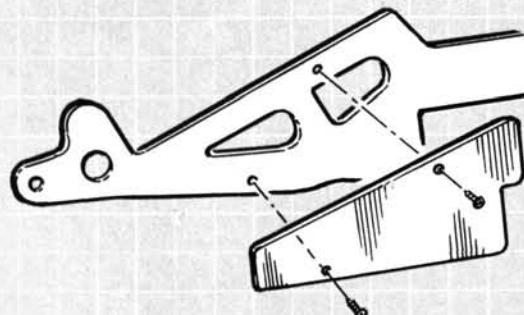
by JIM NEWMAN



QUICK-CHANGE SPRINGS

To quickly change springs on his RC10, this owner cut a slot in the lower spring retainer as shown. Instead of first having to unscrew the ball end to remove the spring, he merely lifts the spring, slides the retainer out sideways, then removes the spring over the ball end. Fast and easy!

Jeff Arcuri, Phoenix, AZ



DIRT SHIELDS

Dirt shields for your Monster Beetle or Blackfoot are easy to make. Cut printer's aluminum litho plate to shape, then attach to the bottom of the frame with 3x12mm screws. Be careful not to drill into the servo bracket. Instead of aluminum, you could use plastic from butter tub lids. The shields prevent mud and grass from packing into the recesses in the underside of the frame.

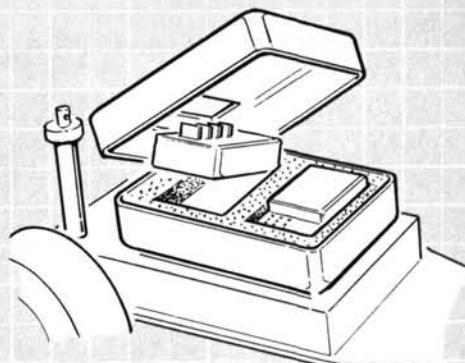
Tom Tice, Sewell, NJ



ROTATING WORK-STAND

This contributor refers to work-stands illustrated in earlier columns. With double-stick tape, he mounted his on a \$2 Rubber Maid lazy Susan, and he now has a useful, lipped tray to hold loose parts.

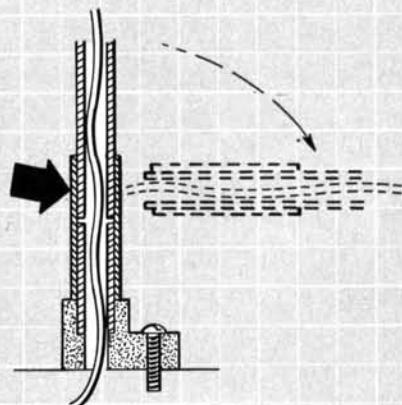
Randy Brooks, Albany, OR



WATER-RESISTANT RADIO BOX

John says it rains a lot in England. (No, really? Now you know why we Limeys have webbed feet!) In order to splash-splash through the puddles, he filled a plastic soap box with sponge rubber, cut recesses for the receiver and battery, and led the wires out through caulked holes. Then he secured the box to the top of his Blackfoot's original servo box with screws or double-stick tape. Some speed controllers require a stream of cooling air, so an opening in the lid is needed, with a sponge gasket to seal against the top of the controller.

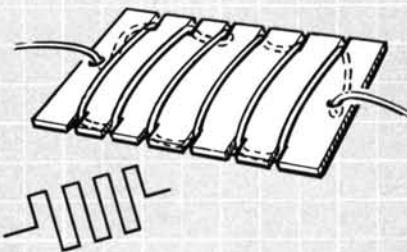
S.Sgt. John Burnett, RAF Bentwaters, England



FOLDING ANTENNA

This owner's vertical antenna made it inconvenient to pack the car for transporting, so he cut the plastic tube about 2 inches above the base, then slid a 2-inch piece of 1/4-inch i.d. plastic ice-maker hose over the join. To fold the antenna flat on the car, just slide the sleeve (arrowed) upwards. Neat!

Terry Martell, Algonquin, IL



SHORTENED ANTENNA WIRE

Todd sent in a useful tip for neatly stowing that excess antenna wire. However, I took the liberty of altering it slightly, so the antenna won't be off-tune (it will if it's coiled). Cut this "comb" from plastic or thin plywood, then zigzag the antenna wire through the slots. This device can be taped to some convenient place.

Todd Olson, Corona, CA

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o **Radio Control Car Action**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

The Inside Scoop



THE R/C CAR industry is rapidly advancing, with new products being offered at a head-spinning rate. So, I'll make manufacturers nervous, but feed you R/C squirrels who are hungry for info, by bringing you a special report on security leaks and "late-in" items. Here goes!



4WD RC10

THE CAR pictured here is the much-talked-about but seldom-seen RC10 4WD conversion (photos by "Smitty" Pond). This isn't the first picture of the conversion, but I thought you'd like a close look at the front drive.

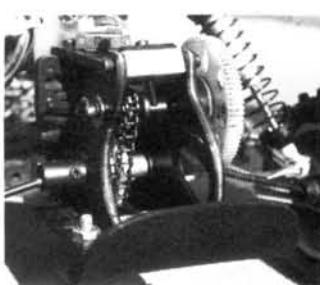


Incidentally, this is a first look at the belt version of the RC10 conversion. The small front diff contains a little ball diff, which is driven by what MIP calls a "MIPIT." According to Mr. Moore at MIP, this unit combines the best features of cogs and sprockets. This MIPIT is designed to prevent dirt from clogging the belt and sprocket.

* * *

CHAIN-DRIVE ULTIMA

THIS ULTIMA chain conversion made its



debut at the Trinity/Car Action Shootout in Quincy, IL. The conversion is supposed to reduce drag significantly because it has fewer moving parts. The chain drives a ball diff, and Robinson, Kimbro, Trinity or any other gears that fit an Associated RC10 will fit this unit. All aluminum parts are made of T-6 aircraft grade, and, for easy maintenance, the entire unit can be disassembled by removing only three screws. We'll be keeping an eye on this one on the race circuit. For more info, call Frank at

ABC Hobby and Parts: (718) 236-3970.

FRONT FROM THE GROUND UP

WHAT'S THIS? Another attempt at a front-wheel-drive car? Yes, only this time the difference is that this car doesn't appear to be an afterthought. Up to now, the standard *modus operandi*



of the manufacturers has been, "Let's just disconnect the rear wheels on our *current* 4WD car and we can market it as a *new* front-wheel-drive car." That's not the case with this one: It has obviously been designed for front-wheel drive from the ground up. Note that the motor is



placed in front of the front axle. Other front-wheel-drive cars have been plagued with traction problems, and "dead" weight had to be added over the front axle; maybe this design is the answer. Manufacturers keep taking a stab at front-wheel

drive because theoretically, it should approach the cornering ability of a 4WD car, while having the lower drag associated with 2WD cars. I'm not sure who the manufacturer is, but those certainly look like Kyosho Gold Shocks to me.

* * *

FLASH!!!



WHIPPOORWILL '88

JUST IN! First reports from Whippoorwill say more than 200 hot racers went wheel-to-wheel on the high banks. The second annual Car Action Weekend Race of Champions had a surprise winner—his first time ever on the superspeedway. The Legend was blown off the track in the Novak 650 by the Little Dude. Watch for a full report on this hyperactive race in our February Stock Car Special.

RACER'S EDGE

by JOEL JOHNSON



WELOCOME TO THE third of my "Racer's Edge" articles. I've had so many calls about the newest batteries, that I've decided to discuss them this month, and I'll clear up some of the misconceptions about the new KR 1700 cells from Sanyo*.

First let's look at developments in the battery market during the last six months. In January, Sanyo informed the hobby industry that it would replace the 1200 SC cell with a higher-capacity, slightly more expensive cell called the KR 1700 SCE. Sanyo still makes the 1200 SCR cell, but everyone is now wondering which battery to run and how to take care of it.

Both the SCR and the SCE have advantages and disadvantages according to the type of racing. During thorough tests, we found the SCR had more voltage than the SCE, but its run time is about 1 to 1½ minutes less. When we tested the SCE, we found that although its greater capacity gave it extra run time, the discharge curve wasn't as good as we'd expected. The curve showed us that, holding its voltage, the cell ran fast for the first quarter of the run, but tailed off slowly during the remainder of the run, until it was fully discharged. The curve on the SCR showed us that this cell would hold a higher voltage through most of its discharge range, and then discharge or "dump" very rapidly in the last quarter

of the discharge cycle. The SCR discharge curve is the more desirable curve, but the run time is so much shorter that it can't compete with the SCE.

Now that you know the characteristics of the batteries, let's talk about taking care of the two types of cells.

- *The SCR cell* is designed to handle a fast charge rate, but to Sanyo that means about two or three hours, not 10 to 30 minutes. Charging the SCR cells at about 9 amps with a max of 11 amps works best. The idea is to get the batteries warm before the run. The more



The little cell that's causing all the controversy—the KR 1700 SCE. The mAh rating is larger but, as Joel explains, bigger isn't always better. Understanding when to use the SCR and the new SCE is more than just knowing capacity.

amps at which a battery is charged, the more voltage it will produce, but it will have a shorter run time. The cell seems to like this type of charging, and it responds very well to it. Be careful not to overcharge the cells, because they could damage whatever they're sitting

on or may even blow up. When charging at this high amperage, always use a peak detector charger, and monitor the batteries carefully!

- *SCE batteries* are a totally different story. These cells weren't designed for fast-charging and are very sensitive to heat and charging methods. Charge them at about a 4-amp rate and don't let them get too warm. The internal construction of the battery isn't as durable as that of the SCR cell, so heat will destroy it very quickly. This is because Sanyo had to fit more into the same size of battery, so the inside separating walls aren't as thick.

After characteristics and care of the cell, we should look at which cell works best for particular applications. First, the SCE cell. I think this cell works best for any type of modified on-road racing (where run time is always a problem) and modified off-road racing (because the shortened run time is also a problem). Because of the voltage difference, the speed may be the same or slower, but the car will run much longer. So you should either put in a hotter motor or gear up.

The SCRs are good in stock motors because run time isn't a problem—speed is. The stock motors respond more favorably to the added voltage of the SCR cell and still get the desired run time.

Before you buy a new set of batteries, decide what type of racing you'll be doing (stock or modified), and make an intelligent choice of batteries; it may save you money in the long run.

*Here is the address of the manufacturer featured in this article:

Sanyo Electric, Battery Division, 200 Riser Rd., Little Ferry, NJ 07643.

TRICK TRUCK AIRBRUSHING

FIVE WAYS TO A STAND-OUT FINISH!



by ERIC GOLDSCHRAFE

BELOVE IT OR NOT, but half of all R/C cars sold today aren't cars at all; they're trucks! A new generation of small trucks has hit like a tidal wave, and the after-market provision of truck-related parts is booming. Personalizing a truck is quite easy, as is improving the handling and performance. Show trucks are now the rage at most custom car shows, and as well as the off-road and pulling trucks, there's even an SCCA Stock Truck Class for sports-car-type road racing.

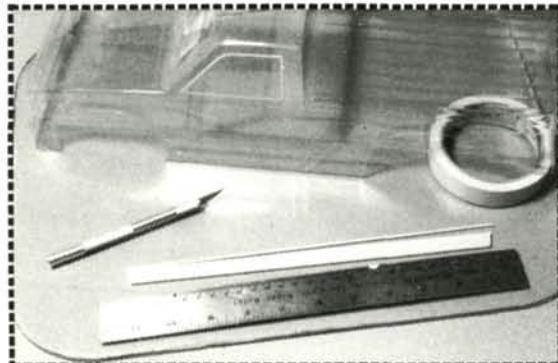
Most of the leading body manufacturers offer several truck styles in Lexan to fit a variety of $\frac{1}{10}$ -scale chassis. Their adaptability allows you to create almost any type of pickup or van. I won't discuss tires, shocks and chassis work, etc.; instead, I'll concentrate on painting and detailing these bodies. The idea is to take your off-road or street machine chassis and turn it into a sharp-looking daily driver that looks good on the road or in the boonies.

Before going into specific details, I'll give you some well-tried tips. I'm not telling you to forget everything you've seen or read on body preparation, but the methods I use *work*, and work well.

You may be surprised to hear that I trim all my bodies *before* I paint them, and I find this especially helpful with trucks. After the surplus Lexan has been trimmed from around the bottom of the body, the body can be lowered over a chassis and "eyeballed" for fit and mounting. The wheel openings in the fenders should be cut next. Where outlines aren't provided, you can draw them on with a china marker. If you place the body over a protruding corner of your work table (use a piece of cardboard, if you're using the kitchen table!), there's enough support to allow you to score along the outline with a reasonably sharp hobby knife. Don't cut all the way through, but just enough to show a visible line in the body. By flexing the fender back and forth a couple of times along the line, you'll be able to snap it off cleanly. You'll have to practice to get this right, but nothing awful happens if you don't cut deeply enough, so you

won't ruin anything. Just go over the scored line with the knife again, and you'll probably produce a clean break.

Mount the trimmed body to the chassis, and check wheel travel to make sure there's enough clearance on bumps and in steering. Do it *now*, before you paint; it will look pretty



Sharp edges on masking tape are created by cutting strip on plate of glass. The $\frac{1}{8}$ -inch-wide strips curve easily for complex designs on compound surfaces.

sloppy if you have to cut into your perfect paint job later on just so you can drive it. Some of the "stepside" and old-timer bodies will be difficult to trim accurately, so cut as closely as you can with a knife or a scissors, and then final-trim with a fine sanding drum on a motor tool. Just remember that it's better to cut away too little at first, because you can't put it back!

When you've finished with the trimming, thoroughly wash the inside of the body with dishwashing liquid and a sponge to get rid of all the dirt and body oils. If you're not going to paint it right away, put the body back in its original bag to keep it free of dust and dirt.

If you don't have an airbrush, you can try painting by hand or with spray cans, but don't expect results like those you see here. You don't need an expensive one, but an internal-mix airbrush is best for this kind of work. You'll need an air supply, too, but you don't have to have a compressor. The propellant cans for air-

brushing are handy, but they don't last long. If you get the valve adapter for your airbrush, a truck-tire inner tube will work, and you can pump it up by hand or fill it at a service station. Another possibility is a portable air tank of some kind.

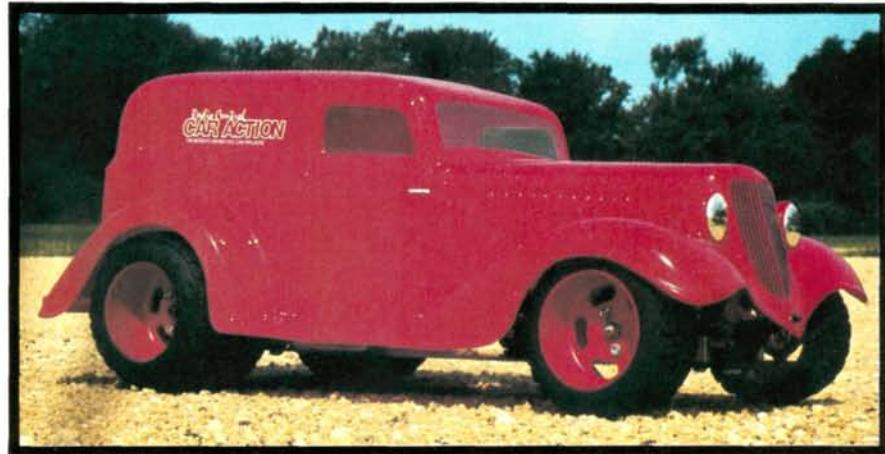
You get better paint jobs with an airbrush, because you can control the viscosity and spray pattern for this fine work. By comparison, a spray can just shoots a coarse spatter pattern, and it's difficult to control the spray. Many blended effects and custom patterns are done with paint thinned so much that it barely covers, even after several coats. The airbrush will also let you mix your own colors and use several types of paint to get the results you want. You'll be surprised how easy it is; you'll become an instant artist! All you need now are some ideas; if you don't see what you like on these pages, look at one of the many full-size truck magazines or go to a local car show. (Take your camera!)

I also use masking tape. You may hear many conflicting statements about the merits and demerits of masking tape, liquid mask, or striping tape, but some of my work can't be done without masking tape. Using a quality tape like Scotch 3M, I lay $\frac{1}{4}$ -inch strips on a piece of glass and cut it into $\frac{1}{8}$ -inch strips with a sharp knife. Discard the two edge pieces, as they always have a coating of fuzz and dirt. The strips may now be used to mask tight-radius bends, e.g., those around windows, or to outline complex designs. When the tape has been applied, run your fingernail along it to eliminate the crepe effect of the tape and to prevent paint from bleeding underneath. You must have clean hands when you apply the tape, as skin oils and dirt will cause problems later. (To really clean your hands, wash the dishes!) Mask off the windows and any other "clear" areas, and you're ready to paint.

EXAMPLE 1: THE MONOCHROMATIC EFFECT

The monochromatic, or one-color, effect has been used for years by European sports car manufacturers, and is now widely used on everything from trucks to custom early-model street rods. The aim is to eliminate all unnecessary chrome and trim and to paint the whole car in one dramatic color. I've combined all three of the previous types of cars in one paint job by painting a '34 Ford sedan delivery truck in Porsche India Red. I thinned automotive lacquer with a medium-temperature thinner, and added a flex agent to keep the paint from becoming brittle. This stuff is super-easy to apply with an airbrush; you actually have to be careful that it doesn't dry *too* quickly. (If it does, it won't adhere well to the body.)

You should allow some drying time between coats to let the solvents evaporate, and you'll need good ventilation. (Do



The monochromatic scheme is obviously simple, but need not look bland if done right.

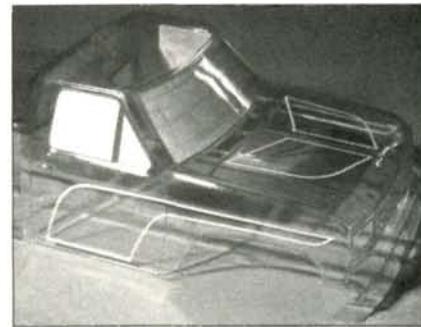
it outdoors, if you can.) Some automotive paints require a clear top coat for real-car applications, but ours are built into the Lexan body! When the paint is dry enough to handle, at an angle, peel back the masking tape from the windows to get a clean line along the painted edge. To avoid some messy problems like glue marks on the windows, don't leave the tape on any longer than necessary. Clean any overspray off the outside of the body

with enamel thinner or lighter fluid. For this vehicle, I cut some black MonoKote* into thin strips and added the grill detail. The white plastic wheels supplied with Advance's* Street Machine kit were dyed red to match the car and then shod with beefy Gatorback street tires (also from Advance), front and rear. The finished truck is a pleasing blend of classic lines and modern techniques.

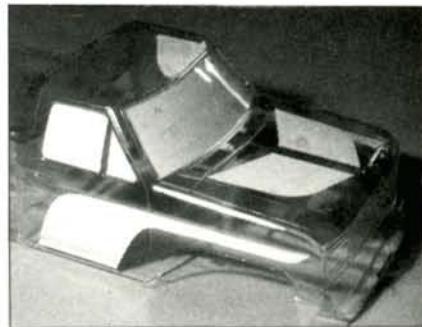
EXAMPLE II: ACCENT PANELS

Let the edge to be blended with the next color fade gradually to the clear section, so that the next color will blend into it. After the yellow had been applied, successive bands of orange, red and maroon were applied in that order, and a coat of white was sprayed behind these colors to brighten them. If you paint darker panels on a light-colored body, you should reverse the masking procedure by painting the panels first and the rest of the body later. When trying to blend or fade into another color, always remember to apply the lightest colors first and to use plenty of thinner. If you want to practice, use the pieces of Lexan that you cut out of the wheel openings. For the finishing touches on this truck, the grill area was painted flat black and topped with pieces of chrome MonoKote trim sheet to give the "floating" grill effect, and "smoked" headlight covers were made with black Mono-Kote. The body was mounted on a Tamiya* Hornet chassis, and it's at home on the pavement or off-road.

For this paint job, I used the Parma* Ford F150 body, which is a popular truck with many possibilities. When the windows had been masked off, the accent panel outlines were delineated with the thin tape strips, and these areas were filled in with pieces of $\frac{3}{4}$ -inch-wide masking tape. The rest of the body was painted with Floquil* Gunmetal Gray, mixed 50:50 with Floquil Dio-Sol thinner and a small amount of the flex additive. When the gray was dry enough (Floquil also dries quickly), the panel areas were carefully unmasked. Starting with the lightest color (thinned), spray the leading edges of the panels yellow. You need a fine spray, so adjust the airbrush until you can produce a line about $\frac{3}{8}$ inch wide as you pass the airbrush over the work surface, about three to four inches away from it.



After windows have been masked off, panel areas are outlined with home-cut thin strips of masking tape.



... Next, panels are filled in with bigger pieces; try to make design complement lines of vehicle.



First, truck body sprayed basic gunmetal color; then masking over accent panels is removed.



Yellow is misted onto front edges of panels...



...Followed by orange, red and maroon.



Mastering accent panels isn't difficult and will make your friends envious.

EXAMPLE III: CLASSIC FLAMES

If you can master the previous technique, you can just as easily paint flames, but there's more preparation required. You can buy "flames" that can be put on the inside or the outside of the body, but then your work isn't an "original" creation, and you're stuck with a universal design. The use of liquid mask to paint flames has been dealt with in a previous issue, but my way is easy and produces excellent results.

First, lay a piece of tracing paper over one side of the hood and lightly sketch the outline of the flame pattern. Next, do the same for one side of the vehicle. Lay the tracing paper on a flat surface and, with a soft pencil, draw the final design for the hood half and the side. Lay several strips of masking tape on a piece of wax paper, overlapping the edges by about $\frac{3}{16}$ inch. Turn the tracing of the design face-down onto the masking-tape patch and go over the design again with the soft pencil. This will transfer the design to the patch of tape. Make another wax paper/masking-tape patch and place the tracing right-side-up on the tape. Retrace the lines, and you'll have a precise mirror-image duplicate of the first one. Next, put the tape/wax paper on a piece of hard cardboard (artist's illustration board works well) and carefully cut along the outlines with a sharp knife. (I prefer the No. 11 X-Acto blade for this.) You just have to press firmly enough to cut through the tape. Now you can pull the tape section off the wax paper and stick it in place inside the body shell. Do this carefully so that you don't damage or stretch the flame design.



Blue tips are added first, then white, yellow, orange and red, blending carefully.



Don't be limited to store-bought flames like everyone else; make your own!

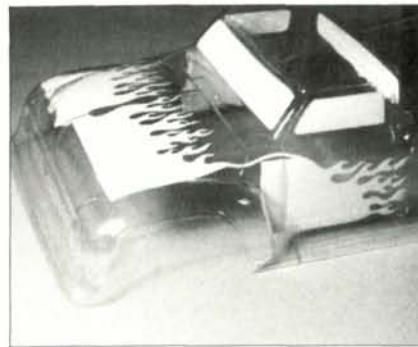


Outline of flames is drawn to size on tracing paper; reverse image will utilize opposite side of paper.



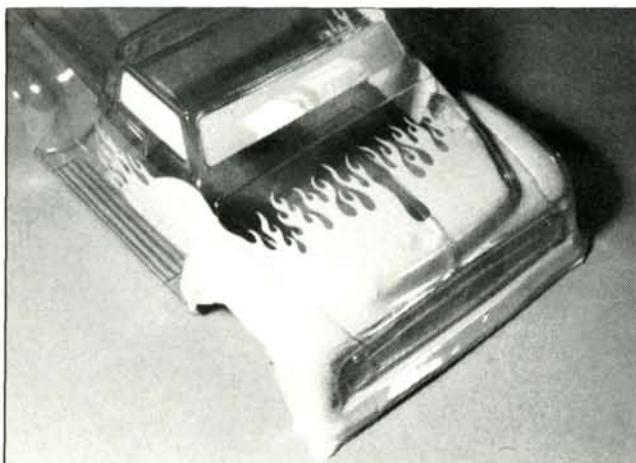
Strips of masking tape are laid on wax paper (won't stick too well) and outline is "carboned" off tracing paper with pencil. Cut design with sharp knife.

Carefully align the opposing side pieces with their respective mirror-image counterparts, and use your fingernail to smooth the tape against the body. Using pieces of masking-tape strips, connect the designs as required, blending them smoothly together, and then fill the rest of the area to be "flamed" with scrap pieces of tape. Now you can paint the rest of the body in your chosen color. Black or dark gray looks classic, but for a *really* wild look, I painted the Parma '53 Ford pickup with Pactra's* Rally Green. When this paint has dried, you can peel off the tape to reveal the clear area to be painted in blended colors. Painting the tips in a bright blue (before any other colors are applied) adds a nice touch. I sprayed white around the front lower portion, and worked into yellow, orange and red, with a white back-up coat to bring out the colors. Pink and purple flames would look good on this green machine, or several other color combinations would work with white or yellow. With darker



Peel off wax paper and mount to inside of body. Connect designs with additional tape strips.

flames on a light-colored body, you'll need to spray on a silver undercoat before you take off the taped-on flames, or the overspray for the flame colors could bleed through the lighter body color. Red will bleed through almost any light color. This body fit neatly onto the Advance chassis to produce an eye-popping street rod.



Rest of design is filled in to front bumper. Body is then painted basic color.



When basic color has dried, remove tape to expose flame area.

EXAMPLE IV: GRADUATED COLORS

When you've developed control of your airbrush and a steady hand, this one is easy. Like the Parma Chevy step-side pickup, when the windows have been masked, you begin with the lightest color. In this example, a thinned mixture of white was sprayed around the lower edge of the body, and this blended into yellow, orange and then red at the top of the body. The hood, roof and deck areas are red. In addition to the MonoKote grill and headlight details, adhesive-backed metal foil is used on the bumpers and roll bar. This foil, which can be found in auto-parts stores, can be "worked" over compound curves with a blunt tool and then polished



With finishing touches of chrome, wheels and bumpers, this Chevy step-side became a main attraction.

to look like chrome.

As you can see, this truck becomes a dual-purpose machine when mounted on

a Hornet chassis (or something similar). Chrome wheels finish the appearance of this custom paint job.



Body with masked-off windows and application of first color (white) around lower portion.



When the white has dried, the second color (in this case, yellow) is added.



Next, the third color (orange) is applied to tops of fenders. Upper surfaces are still clear.

EXAMPLE V: CALIFORNIAN NEON

Smooth-side pickups, e.g., the BoLINK* Chevy S-10, are perfect subjects for the latest Californian custom paint treatment: neon stripes. With this scheme, body color is important, as many colors (particularly bright reds, oranges, etc.) will soften the effect, and it won't look as dramatic as it could. I used a dark metallic blue as a basic body color, but black or white would be equally effective. Begin by masking off the windows, and then use the glass-cut masking-tape stripes (as outlined earlier) to lay down the striping. Straight stripes look good,



A few bright neon strips do wonders for this otherwise mundane monochromatic paint scheme.

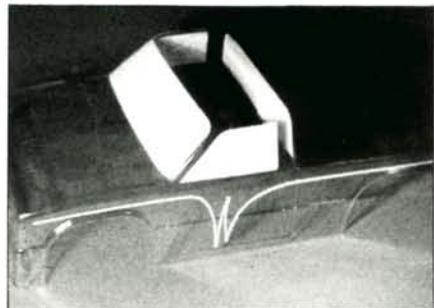
but the trend is toward daring Z-bends that break up the straight lines, with the colors interlacing where the lines intersect. You can try several different arrangements, peeling off the tape strips until you find a pattern you like. Lay in the opposite side by looking through the body and sighting along the lines as you go. Rub the strips down with your fingernail to seal them.



When the body color has dried (add a silver base coat if you used white), carefully peel back the strips of tape. For real neon stripe colors, you'll need fluorescent paint, which is available in sets from Pactra or Testor's*. This stuff is a little difficult to use, and the ratio of thinner to paint is critical. First add about 25 percent thinner, or just enough to get the paint to spray cleanly, and then try it on some scrap. Since there isn't much paint in those little jars, you might prefer to experiment with one of the colors you won't be using. This stuff dries quite slowly, especially if the weather is humid, and you must let each coat dry fairly well before you apply the next one. The fluorescent paint doesn't cover well, and it will take several coats to get it right. It shouldn't be completely opaque; you should still see light through it if you hold it up to a lamp. When the paint is completely dry, spray on a coat of white to bring out the fluorescence. If you did everything right, the stripes will look like

illuminated neon bars running down the side of your vehicle.

This truck was also mounted on a Hornet chassis, although many other popular on- or off-road chassis will work out well, too.



The basic first stripe. This may be all that's needed, but more can be added for the rock 'n' roll pickup.

By now, you're probably thinking of your own designs—perhaps even of combining some of the techniques explained here. You can now look at a photo of a full-size truck and figure out how to do the painting if you want to model it. Naturally, this stuff works on cars, too, so let your imagination go wild! Just remember some of the important details of the different techniques, and you'll soon be

producing paint jobs just like those of the pros. Remember, even they were once novices!

*Here are the addresses of the companies mentioned in this article:

MonoKote; distributed by Top Flite, 2635 S. Wabash Ave., Chicago, IL 60616.
Advance Engineering & Mfg., P.O. Box 766, Woodland Park, CO 80866.

Parma International, Inc., 13927 Progress Pkwy., N. Royalton, OH 44133.

Floquil, Rt. 30N, Amsterdam, NY 12010.
MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.

Pactra, 410 N. Michigan Ave., Rm. 1280, Chicago, IL 60611.

BoLINK R/C Cars, Inc., 420 Hosea Rd., Lawrenceville, GA 30245.

Testor Corp., 620 Buckbee St., Rockford, IL 61101.

OFF-ROAD THUNDER!

WITH GLOBAL bragging rights up for grabs, 1989 off-road action is sure to see fierce competition like never before. The IFMAR $\frac{1}{10}$ -scale Off-Road Worlds are scheduled to be held in Australia this summer,

THE HOTTEST OFF-ROADER FOR '89

and some new drivers and manufacturers are sure to stand out. National organizations will crown new off-road champions in '89, and during the hundreds of weekly local events, many new drivers will capture their first victories. A few of these will be the young new talents who will steal the titles from the big boys, and then they'll be the new national figures in the R/C race world. That's the way it is in the world of competitions. Of course, the other big question is: What will these champs, be they new or old, be driving? With that in mind, here are some $\frac{1}{10}$ -scale off-roaders to watch. R/C Car Action predicts the hottest dirt machines for '89.

RACE PREP/AYK PRO RADIANT

Radiant racers have joined the mid-engine revolution. The latest Race Prep/Ayk off-road machine is the 4WD Pro Radiant, a chain-driven car that employs a unique twin vertical-rail chassis design. There's virtually no flex in this system. Adjustable ball differentials are used on each end of the Radiant, and one-way bearings are used on the front hubs. Oil-filled coil-over shocks on all four corners really smooth out the rough spots on the track. Low-profile spiked tires are mounted on lightweight one-piece racing wheels. Ten ball bearings are included in the kit, and a Lexan rear



wing keeps the rear tires glued to the track while racing. Race Prep/Ayk is making a serious effort to win the majors with the Pro Radiant.



TEAM LOSI JR-X2

Team Losi's 2WD leaper should have a banner year in '89. The JR-X2 has been in development for over

two years, and now it's ready to go. The X2 is quick down the straights and straight off the jumps. Losi's unique trailing-link rear suspension makes it easy to identify the JR, and pressurized shocks are found on all four corners. The stock chassis is made of graphite; no need to look for an after-market chassis. This car is designed to be raced without any changes. An externally adjustable differential helps to get the power to the track, and stainless-steel ball bearings are standard. It has taken quite a while for Team Losi to get this car to you, but now that the JR-X2 is here, the 2WD class should be exciting!

YOKOMO C4

One of the hottest potential performers of '89, the new Yokomo C4 promises to grace the A-Mains of many top-level races around the world. The C4 features a mid-motor mounting position with a torque limiter. From the torque limiter, two separate belts drive the front and rear ball differentials, which are housed in very durable aluminum blocks. The chassis is cut from black fiberglass and will accommodate saddle-type batteries. Although *Car Action* hasn't



yet had an opportunity to assemble and test the elusive C4, we did *run* it, and this car is no slouch.



TAMIYA AVANTE

Tamiya's radical new Avante will be a car to watch in '89, and Tamiya hopes the Avante will capture the World Championship in Australia. This is Tamiya's first attempt at producing a truly competitive racer. While Tamiya chose to stick with a shaft-driven 4WD system, the Avante

is definitely not a warmed-over Hotshot. In fact, the Avante appears to be one of the most original R/C car designs. An adjustable ball-type differential transfers power from the Technigold RX-540VZ motor to the parallel drive shaft, and geared differentials are used at each end of the drive shaft to get the power to the wheels. Liberal use of high-quality ball bearings keeps the drag low throughout the drive train, and the shaft drive and the diffs are designed to minimize drag due to side thrust. The Avante's suspension system probably has more adjustment points than any other car, although more travel in the front is still needed. While it may take some thrashing to dial-in the Avante, it should be possible to make the car do what you want on the track. Look for the Avante to put up a fight in Australia.

SCHUMACHER CAT XLS

Everybody wants to skin the cat—the Schumacher Cat that is. The current 4WD World Champion is the target the others are aiming at. The latest Cat from Schumacher is the XLS, and this car includes all the optional parts that were used on the '87 World Championship winning car. Ball-type differentials are used on both ends of this belt-driven machine, and four oil-filled coil-over shocks keep the chassis off the ground and the tires on the track. Up front, one-way bearings are used on the drive shafts. The fiberglass chassis plate gives the Cat a low center of gravity and a Lexan chassis pan prevents dirt from fouling the gears or radio equipment. While the Cat isn't an easy car to build, it has proven that it can



perform, especially with the Schumacher low-spiked tires that are now being used (or copied) by most of the competition. The Cat was designed for all-out racing and the XLS is ready to take on the competition in '89. While there may be more than one way to skin a cat, you still have to catch the Cat first!

KYOSHO TURBO OPTIMA MID SE

Kyosho is turning up the heat once again in the 4WD car wars. First, the Optima and all its progeny, then the Mid, and now the Turbo Optima Mid SE is ready to burn up the tracks in 1989. In '87, Kyosho forced the world to take note when five Optima Mid prototypes made the 4WD World Championship A-Main. The SE incorporates most of the features that were found on the prototypes. Front and rear ball differentials lead the list in performance options included in the kit. These fully adjustable units effectively distribute the power from front to rear. A complete ball-bearing set reduces friction while increasing speed. Carbon-fiber shock mounts are coupled with Kyosho Platinum shocks to keep the low-profile tires in the dirt.



Included with the Turbo Optima are front and rear anti-roll bars, which translate the motor's power into cornering ability. A high rpm LeMans 240ST is also included, and this keeps the belt-drive turning on the Optima. A duraluminum-alloy pan chassis provides strength while it lowers the center of gravity. Kyosho is looking for the Turbo Optima Mid SE to bring home the gold in '89.



ASSOCIATED RC10

The RC10. What else really needs to be said? Associated's 2WD land-missile flies wherever there's dirt. Whether going over table tops or blasting around dirt ovals, the RC10 is the car to beat. In '89, Associated wants to erase the one blemish on its record by recapturing the 2WD World Championship. While other

manufacturers produce a vast array of parts for the RC10, the stock kit is bulletproof and undoubtedly wins more races than any other car. The RC10 has an extremely efficient gearbox with an adjustable ball-type differential. Gold shocks are some of the best ever, and they've been used successfully on 20-pound $\frac{1}{4}$ -scale sprint cars. And while we're on the subject, RC10 sprint-car conversions continue to collect one National after another. The standard RC10 is available with or without ball bearings, and it has a sturdy aluminum tub-style chassis that protects the radio gear and battery pack. Associated may have lost a battle in '87, but they're still in position to win the war. As always, the RC10 is one of the hottest cars, no matter what year it is.

(Continued on page 34)

HOTTEST OFF-ROADERS FOR '89

KYOSHO TURBO ULTIMA

Kyosho took on the world and won, and now the World Champion Ultima has received the turbo treatment. Kyosho wasn't about to rest on past victories; they want more! The Turbo Ultima is a race-proven refinement of the standard Ultima with a new ball-type differential replacing the gear unit. This diff was in the development stage throughout the '87 race season, proving itself worthy as stock equipment on the Turbo version. Four Platinum shocks are used to smooth out the bumpiest tracks, aided by front and rear anti-roll bars, which give the Turbo driver suspension tuning that's even more precise. A special aluminum chassis is the real backbone of the Turbo Ultima. Kyosho has made the LeMans 240ST the standard motor for this hot car, and a full set of ball bearings increases the Turbo's



speed and acceleration. The low-profile tires help to keep the center of gravity low while they tear up the track. Will Kyosho be able to retain their world title? If not, it's not because they didn't try. Watch for the Turbo Ultima in A-Mains around the world in 1989.

REEDY

Modifieds

Reedy Modifieds Are
Bursting Through
With New Technology

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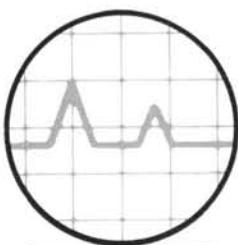


3585 Cadillac Ave.
Costa Mesa, CA 92626 USA

(Graph shown represents actual comp readout of Reedy Modifieds motor.)



SCOPING



PING

BY RUDY MEYER

SCOPING OUT: As we're committed to bringing you the most up-to-date technical information on R/C products, Radio Control Car Action now has Rudy Meyer, an accomplished electrical engineer, to test the newest high-tech electronic equipment that's flooding the R/C market. "Scoping Out" is a two-part test in which a product is first subjected to extensive bench testing using sophisticated equipment and then actually used in the field. These tests will allow us to expose any ridiculous performance claims and, at the same time, provide R/C car enthusiasts with invaluable information on where they should put their money!

YOU'RE AT THE starting line waiting for the green flag; your model is in rare form and ready to win. The flag is dropped and the race begins. You pull the trigger stick to its maximum position, and your car hesitates on acceleration. The problem? You're still using a mechanical speed controller instead of an electronic one.

This month, "Scoping Out" tests the Tekin* ESC-170 Pro P electronic speed controller. I might help you decide to trade in your mechanical speed controller for an electronic one.

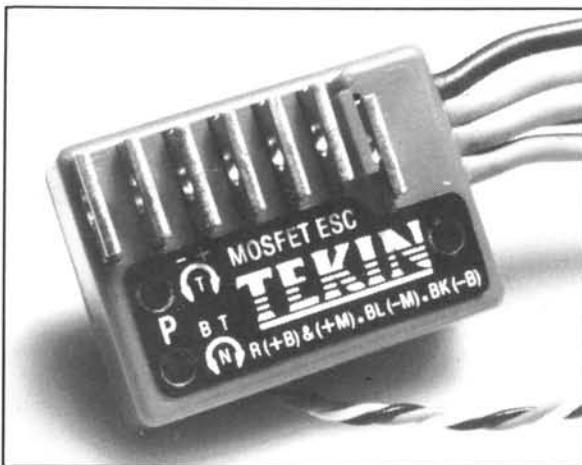
With its dimensions of 1x1.5x5 inches, the ESC-170 Pro P is ideally suited to $\frac{1}{12}$ -scale models, but it also incorporates these features:

- Ten-cell battery capability (12 volts)
- Full-speed LED indicator
- Receiver connector options
- BEC (battery elimination circuitry)
- Proportional acceleration and braking
- Ease of adjustment

With 10-cell capacity, the Tekin can be used in many forms of racing: ROAR $\frac{1}{10}$ - and $\frac{1}{12}$ -scale on-road racers can use



The Tekin ESC-170;
Small Enough
for $\frac{1}{12}$ Scale,
Tough Enough for
10 Cells.



TEST DATA

Model Tekin ESC-170 Pro P

DIMENSIONS:

Height5 inch
Width 1.5 inches
Length 1 inch
Weight 1.1 ounces, without wires and heat sinks

Access to Controls Fair
Ease of Adjustment Good

ELECTRICAL: (Manufacturer Specs)

Max Voltage 12V
Max Current 720 amps
Max Voltage Drop03V at 12 amps

TEST PARAMETERS:

Voltage 6V
Current 12 amps
Voltage Drop 13V (from battery to motor)
Price as Tested \$177.98

six cells; off-road modifieds and NARA superspeedway cars run the Pro P with seven cells; and drag racers can use the full 10-cell limit.

The full-speed LED helps you adjust the speed controller to the transmitter. When the LED comes on brightly and solidly, the motor is running at maximum rpm, and this eliminates the need to measure the voltage across the motor with a voltmeter, or to listen for maximum rpm.

With its BEC, this controller is ideal for $\frac{1}{12}$ -scale models, since the need for the receiver battery has been eliminated. The only drawback is that you can't easily bypass the circuitry when using a 4-cell battery pack.

By adjusting the neutral and throttle pots located on the speed controller, you can set up the proportional acceleration and braking to suit your model and the course. The neutral and throttle pots are located below

the top cover of the controller, but they're aligned well with the hole in the top cover. It's slightly difficult to insert the screwdriver into the slots of the pots, but it isn't as difficult as with other controllers. On this controller, the pots move correctly, i.e., for clockwise rotation of the pots, the controller increases motor rpm.

The ESC-170 Pro P is available with the following receiver connectors:

- Futaba J or G
- Airtronics
- Magnum series
- KO Pro P

With this wide variety of receiver connectors, there's no need to mate the correct plug to the speed controller, possibly making a mistake that would destroy the speed controller and your receiver.

Now the ESC-170 Pro P electronic speed controller is ready for "Scoping Out" tests. The controller was tested

(Continued on page 38)

You think your RC Truck is tough?

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Height: 10 1/2"
Width: 10"
Scale: 1/10



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SCOPING OUT

with a battery voltage of 6 volts and a motor current of 12 amps. The motor we used draws considerably less than 12 amps, and, for that reason, we added a dummy load to the motor circuit to bring the test current up to 12 amps. In our tests, the motor was strictly used to evaluate the braking capabilities of the controller.

With a motor current of 12 amps, the controller had a voltage drop of .13 volts from input to output, which is from the battery to the motor and includes the wires. This voltage drop will vary according to the motor load the controller has to drive. The more current the motor draws, the larger the voltage drop across the controller will be.

Adjustment of the ESC-170 Pro P to the transmitter is easy, and well-documented in the instruction manual. The first adjustment is to the neutral pot. With both the transmitter and controller powered, and the trigger/stick in its neutral position, adjusting the neutral pot clockwise until the motor just starts to spin, and then backing off until the motor stops, will give linear acceleration with approximately 25 percent braking. Adjustment of the neutral pot counterclockwise will increase the braking rate, but will also increase the trigger/stick movement before acceleration occurs. Adjustment of the throttle is accomplished by moving the trigger/stick to its maximum position, and then adjusting the throttle pot clockwise until the full-speed LED illuminates brightly without flickering.

To turn the controller into a drag controller, allow the trigger/stick to return to its neutral position, and then adjust the throttle pot clockwise a little. Now, for very little trigger/stick movement, the motor will be at maximum rpm. To desensitize the controller, adjust the throttle pot counterclockwise.

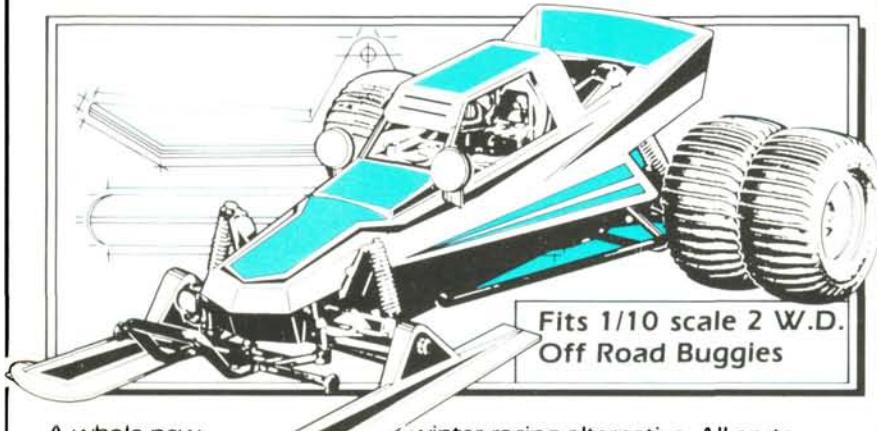
The ESC-170 Pro P is a well-constructed and well-designed unit, with only one minor design flaw. The BEC can't be bypassed easily. Most controllers bring out two wires that, when joined together, allow the modeler to use a 4-cell battery pack. The ESC-170 Pro P doesn't have this feature.

The size of the controller makes it ideal for 1/12-scale models, so the bypass wires are almost imperative.

The warranty on the ESC-170 Pro P covers materials and workmanship for 120 days, and this is very good. However,

(Continued on page 66)

S.T. 1000 Winter Conversion Kit



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KYOSHO

Baja Bugs



by RYAN FITZ

TWO OF THE HOTTEST R/C off-road cars—the Kyosho* Ultima and the Kyosho Turbo Optima—have footsteps that are being followed. Even though these two $\frac{1}{10}$ -scale off-road giants have left big steps to fill, their new $\frac{1}{20}$ -scale brothers are giving it their best shot.

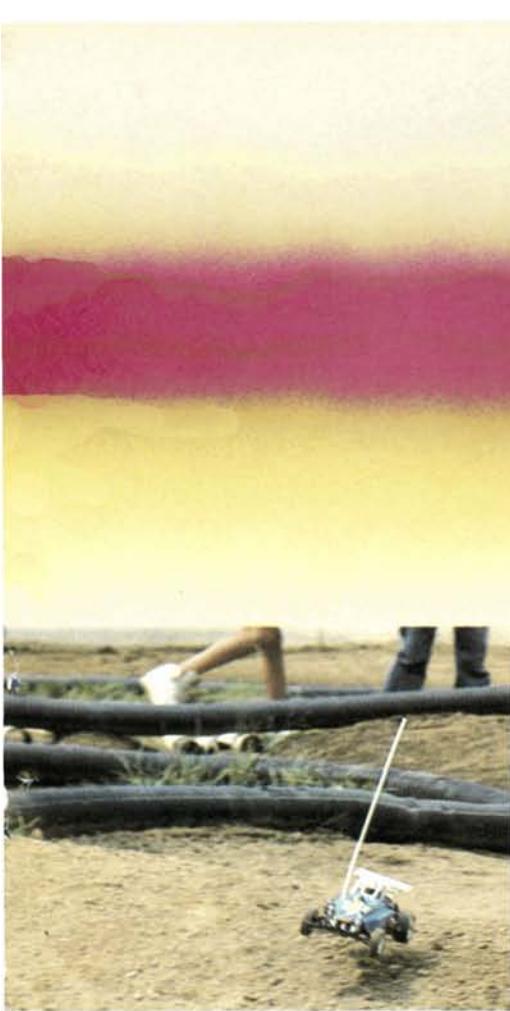
The $\frac{1}{20}$ -scale Ultima and Turbo Optima are 2WD dirt-kickers that can give you big-time fun in the smallest places. You can race these cute, fast, rugged buggies in a gym, a living room, on a patio, or at your favorite off-road speedway. The Baja Bugs offer standard features like fully functioning four-wheel independent suspension

for maximum handling and quick acceleration, and high speeds produced by the LeMans DM20 powerplant. The Baja Bugs even come ready to assemble, with a 7.2V, 270mAh Ni-Cd battery for a solid 15 to 20 minutes of running time.

Under their Lexan replica bodies, the Bugs have a set of very effective, lightweight aluminum friction-type shock absorbers that have coil-over springs and optional tension collars, so you can fine tune your suspension to suit any driving conditions. The main chassis plate is a one-piece aluminum tray that's designed to provide maximum protection for your Baja Bug. Like their big brothers, these $\frac{1}{20}$ -scale replicas also include a radio plate made of ABS plastic, which provides light, strong additional protection for your car's radio gear.

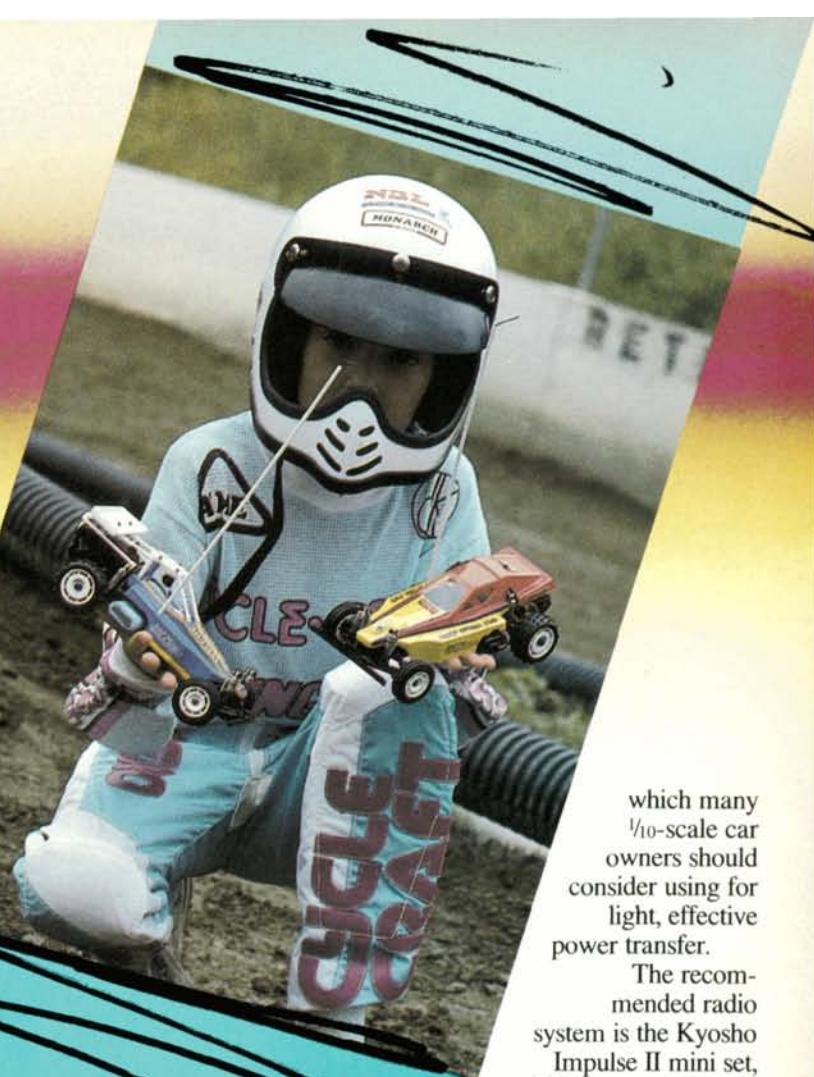
On each of the corners of the Baja Bugs

Photos: Walter Sjödä



there's a wishbone/parallel arm suspension setup. The parallel arm portion of the suspension takes the place of the upper link used by the Bug's big brothers. With this type of suspension-arm configuration, you can get top handling from any size of car, including the Ultima or Turbo Optima Baja Bugs.

At the rear of each Bug is a gearbox that houses a bevel/planetary gear differential complete with Oil-lite bronze bearings. (No plastic here, thank you!) This gearbox is totally sealed to protect the Bugs from adverse conditions, and it includes a tough nylon motor guard to completely protect the LeMans DM20 motor. Power from the gearbox is transferred to the rear wheels by a set of aluminum half-shafts,



which many $\frac{1}{10}$ -scale car owners should consider using for light, effective power transfer.

The recommended radio system is the Kyosho Impulse II mini set, which has an R/S unit.

The compact R/S unit is a combination receiver and speed control operating on 27MHz for maximum range and a clear signal. The mini set also includes a mini steering servo, because, as you can well imagine, space is

limited, and standard-size radio components would never fit. The R/S unit is available in two fully proportional versions: forward with brake, or forward and reverse with brake. Whichever you prefer, the R/S unit will meet your needs.

The construction of your Baja Bug takes only an hour and a half, and you're on the road almost before you know it! The 33 basic assembly steps in the manual are very well illustrated, so a novice car builder could easily follow them, even if there were no written explanation. The only frustration might come from working with some components that are too small for your fingers, but with a deep breath and a little patience, everything goes together without a hitch.

(Continued on page 43)

BAJA BUGS

(Continued from page 41)

KYOSHO



BAJA BUG

Type Ultima & Turbo Optima 2WD
Scale 1/20
Sug. Retail Price \$79.95

DIMENSIONS:

Overall Length 7.9 inches
Width 4.3 inches
Height 2.6 inches
Wheelbase 5.2 inches
Front Track 3.5 inches
Rear Track 3.5 inches

WEIGHT:

Gross (w/ battery) 13 ounces

BODY:

Type Off-road buggy
Material Lexan

CHASSIS:

Type Flat plate
Material Aluminum

DRIVE TRAIN:

Type (prim./sec.) Pinion/Spur gear
Differential Enclosed bevel/Planetary

SUSPENSION:

Type (f/r) Wishbone with upper link
Dampering (f/r) Friction coil-over shocks

TIRES:

Front Ribbed
Rear Spiked

ELECTRICS:

Motor LeMans DM20
Speed Controller Not included
Bearing Type Bronze Oil-lite
Battery Type Required 7.2V, 270mAh included

OPTIONS AS TESTED:

Kyosho Impulse II two-stick radio with R/S unit and mini servo.

COMMENTS:

Small components can be frustrating during assembly. Aluminum chassis plate takes a pounding while providing good protection to radio gear and battery. Suspension works surprisingly well, considering how small the Bugs are. Positive differential action makes the Baja Bugs perform like their 1/10-scale big brothers. Great fun to build and drive, with only your imagination to stop you from finding a place to race them.



Kyosho R/S Mini-Set includes mini steering servo and integrated receiver/speed control unit in one small package.

One tip that will make assembly (or should I say, adjustment) easy, concerns the front-wheel toe-in settings. At step No. 27, when you're installing the one-piece tie rods, try to make any necessary adjustments. When the radio plate is in place, access to this area is very limited, and you should avoid having to disassemble the whole top half of the car by making the adjustments at the time of installation. It might take a little guesswork, but you should be able to get the adjustment very close; by putting the front wheels on at this point, you'll have a better view of the toe-in setting.

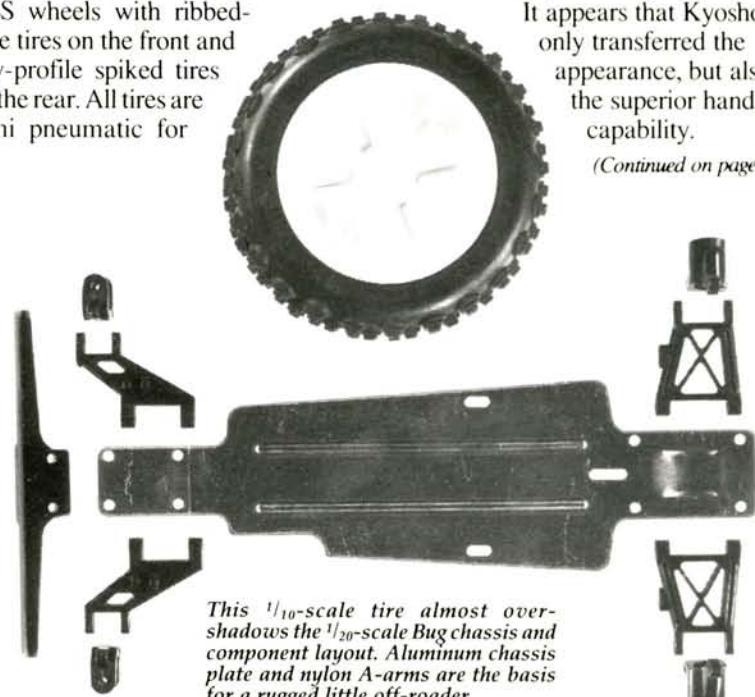
The standard wheels and tires for the Bugs are one-piece ABS wheels with ribbed-type tires on the front and low-profile spiked tires on the rear. All tires are semi pneumatic for

good all-around performance. I hear that even if they're not available yet, in the very near future, foam tires for indoor or on-road racing will be available.

On the track, the Baja Bugs perform just as well as the big ones. Quick acceleration and the ability to leap with great authority makes driving them a blast. The Bug's response on a 1/10-scale racetrack is impressive, to say the least. Even given the lightness of the Bugs, their stability was excellent, due to a good distribution of radio components and battery pack. The Bug's suspension worked to keep the bouncing of these light competitors to a minimum, even on jump landings.

It appears that Kyosho not only transferred the appearance, but also the superior handling capability.

(Continued on page 108)



This 1/10-scale tire almost overshadows the 1/20-scale Bug chassis and component layout. Aluminum chassis plate and nylon A-arms are the basis for a rugged little off-roader.

OFF-ROAD THUNDER!

CAR ACTION

NEW ENGLAND CHAMPIONS

Is non-sponsored racing with equally timed motors more

MANY of the races sponsored by RCCA feature big-name drivers at the top level of competition. This kind of racing allows manufacturers to test and develop their products, resulting in improvements that benefit the consumer. But drivers competing at the local level seem to get lost in the dust. RCCA and Trinity* sponsored the New England Championships to salute these drivers, most of whom were unsponsored and racing at the local level.

The first weekend of races was a washout—literally. After

by STEVE POND

days of preparation, the track was ruined by heavy rains. The race was re-scheduled to run two weeks later and, although the weather report was again unfavorable, the rain held off long enough to complete all the racing.

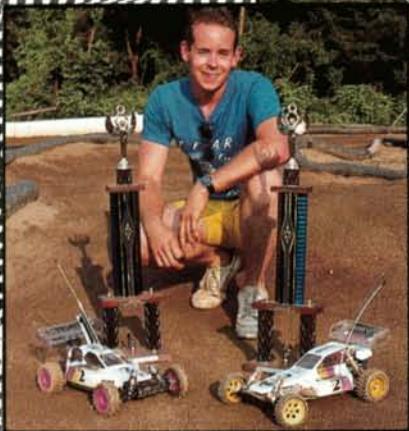
Five classes of racing were run: Production, 2WD Stock, 4WD Stock, 2WD Modified and 4WD Modified. Entrants in the Stock Classes were given Trinity Monster Horsepower stock motors. These new motors are manufactured with the timing bumped back to prevent the premature burn-out that many of the new stock motors are experi-



The BORRA track in Bethel, CT was the site for the Car Action New England Champs.

AND HIPS

fun?



Left: Frank Massi dominated the Modified Class in both 2WD and 4WD, taking 1st place in both A-Mains.
Below: Doug Stroh Sr., driving this Blackfoot, won the A-Main in the Production Class.



Frank Massi's RC10 was true to form as it swept Qualifying and the 2WD A-Main.

encing as a result of excessively rapid timing.

The qualifying rounds proved to be testing grounds for the drivers as they experimented with different gearing, tire and suspension combinations. Although occasionally some dust was

raised, the damp weather kept the track moist. For both the 2WD and 4WD cars, the tire of choice was the Schumacher Cat*. Once all the cars were dialed-in and the qualifying results were complete, the lower Mains began. Working their way to A-Main in the Production Class, in which all the cars were required to run as they come out of the box, Doug Stroh Sr., driving a Blackfoot, and Doug Stroh Jr., driving a Futaba* FX10, monopolized the Production A-Main. First-place winner, Doug Stroh Sr., proved the slow-and-steady-wins-the-race theory by running slower and more consistent laps. Although he had a faster machine than his father, second-place winner Doug Stroh, Jr. had some minor trouble navigating a couple of turns.

The 2WD Stock A-Main produced some of the day's most exciting racing. Nick Leone, one of the club's point leaders for the year, ran his graphite

NEW ENGLAND CHAMPIONSHIPS

Ultima to take top honors in the class, but Mike Lapiatte, Scott Law, Mike Beaudry and Bob Waldhaos were right on his heels. Leone had the quick lap average of 15.16 seconds for a total of 16 laps, while Mike Lapiatte turned 15.71-

second laps to take home second place, also with 16 laps. Three other cars also finished on the lead lap only seconds off the winning pace, for the closest finish of the day.

The 4WD Stock A-Main was taken by Billy Ochs, driving a Kyosho* Optima with a belt conversion. Ochs scored a decisive victory in the Main with second-place finisher, Chris Hanlon, one lap less than Ochs and more than a full second off the winning average lap time. Karen Dahl, although a couple laps down at the finish, was able to bring home a third-place trophy with her Optima. A new track record was established for the 2WD Modified A-Main as Frank Masi, driving a graphite RC10 with A&L trailing arms and an MIP* differential, turned 17 laps running a Twister* motor. John Pavlick, winner of the Concours, showed everyone that his car wasn't all show when he took fourth place only a quarter of a second behind the second- and third-

place finishers.

The close race in the 2WD Modifieds was between Ron Haupler and Jim Corbett. When it came to the line, Haupler just had the edge with average lap times only thousandths of a second less than Corbett. Nick Leone, winner of the 2WD Stock Class, experienced some mechanical trouble that only allowed him to finish eight laps. The last Main of the day was the 4WD Modified Class with the winner of the 2WD Modified and TQ for the 4WD A-Main, Frank Masi, leading the field with a Kyosho Optima Mid. Masi's closest competition was Ron Vitti, driving a Schumacher Cat and running a Trinity motor. Early on, it looked as though Vitti would give Masi some trouble, but as the race crested the 3-minute mark, Vitti's Cat showed some symptoms of dumping and Masi skated in for the win.

When the dust had finally settled, Masi was crowned king in both the 2WD and 4WD Modified Classes with two clear-cut wins, while Ochs took 4WD Stock, Leone squeaked by for the 2WD Stock title, and Stroh and son took first and second in Production.

RCCA would like to congratulate the winners of the New England Championships, as well as the other competitors who didn't go home with a trophy, but still gave it their all.

Although RCCA isn't able to sponsor every race at the local level, we know that these racers and others like them keep our hobby growing. Hats off to the racers who brave the elements every weekend and head for the track!

**Here are the addresses of the companies mentioned in this article:*

Trinity, 1901 E Linden Ave., #20, Linden, NJ 07036.

Schumacher, distributed by TRC, P.O. Box 478, Oakboro, NC 28129.

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

MIP, 838 Edna Pl, Covina, CA 91723.

Futaba Industries, 555 W. Victoria St., Compton, CA 90220. ■



Left: Doug Stroh Jr. made the Production Class a father/son sweep, taking 2nd place in the A-Main.



Karen Dahl, shown here with her 3rd place Concours Optima, also took 3rd in the 4WD Stock A-Main.



Adding realism to your street machine...

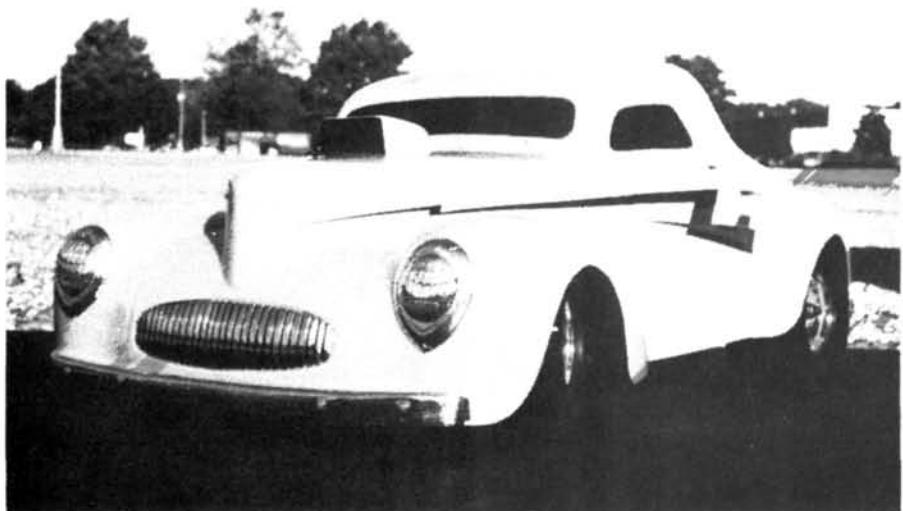
by ERIC GOLDSCHRAFE

MANY OF THE exotic hot rods you see at car shows or in magazines will never see the street, unless on a trailer. Those wild street machines and wild rods are just too temperamental and hard to handle on the highway, and the operating costs are prohibitive. Some neat street rods do make it past state inspections and local law enforcement troops and are driven regularly on rod runs, Friday-night cruises and to the local drive-ins. These cars are street-legal and reliable because the builder has sacrificed some of the potential performance of his car. Don't get me wrong: A lot of these machines are real beasts, but concessions have to be made. For instance, instead of 13-to-1 compression and 106-octane racing gas, the engine might be built with lower compression for street driving, and use a nitrous-oxide setup when extra power is called for.

The world of R/C street machines is the same: You can't take a fragile racing chassis, bolt in a radical rewind, stick in a 7-cell pack, add a '55 Chevy body, and expect it to be a fun car with which to fool around in the street near your house. So how can you create the ultimate street machine? Plan it, build it to be reliable and be *innovative!* The '41 Willys used for this project uses many contemporary hot-rodding tricks or their equivalents, and it's a fun-to-drive machine that really moves when you put your finger to the trigger.

The chassis is the Advance* Custom Street Machine car with a few added options. I used the big Gatorback street tires because they perform well, provide adequate traction, and absorb the bumps and irregularities in the road surface. They look great, too! These

THE BEAST WITHIN

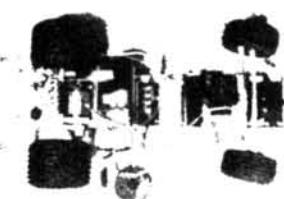


The '41 Willys has all the street-rod internals to match its muscle-bound macho look.

tires mount easily onto the supplied wheels, which were dyed to match the car. (Instructions were included.) The front of the fiberglass chassis plate was painted flat black to make it less visible under the front of the body. It could have been shortened somewhat, but Advance designed this car kit to be universal, and I wanted to be able to change things around and use a different body in the future.

Like most contemporary full-size street rods, this model uses "billet" (bar

stock) aluminum parts. A strong Leisure* motor with a turned billet can give the impression that this car means business, and it has adequate torque and rpm for the street. To make this installation practical, I used a Kyosho off-road clutch from Tower Hobbies*. This device slips a little on takeoff, allowing the motor to build up some revs and get on the power curve. This saves the battery a little, and makes the car easy to handle in confined areas. It's comparable to the automatic



CHASSIS



SOUND

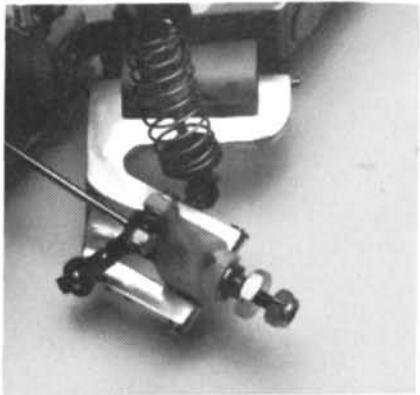


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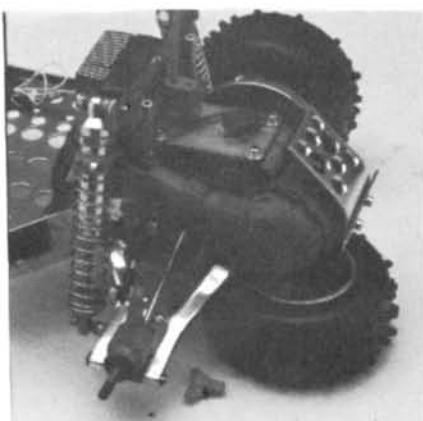


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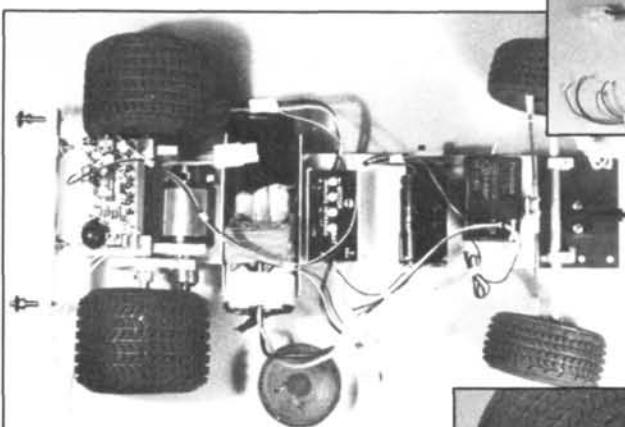


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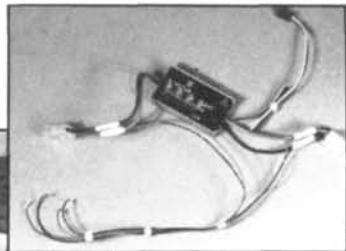


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CONCORD, CA 94520
415-798-7319

THE BEAST WITHIN



Overall chassis layout shows "full-house" street-machine setup. Note that chassis is offset to left (to make up for extra length of clutch assembly) to allow tires to stay under body lines. Speaker is at bottom.



Extra pairs of wires on input and output sides of electronic speed control run to sound unit. Make sure polarity is correct! Sound units aren't fused and will fry instantly!



Robbe "large diesel" sound unit recalibrated to mimic healthy V-8 mounts over motor.

transmissions with high-stall-speed converters that the big cars use to tame a wild engine for street use. A 7-cell Ni-Cd battery pack supplies enough power to run this combination impressively, and a Robart* electronic speed control adds solid-state reliability and flexibility.



Kyosho clutch assembly mounted on Leisure motor "tames" rewind for street use.

All right, so it looks neat... now what do you add for the ultimate touch? Well, it still doesn't sound like a hot-rod, but you can add an electronic sound unit. I chose the Robbe* large diesel sound unit because it can be adjusted to produce a realistic "rumpty-tumpty" idle, and you can set the speed to come on as you like it. Also, with a decent-size speaker, it's loud—louder than most other units. If you put a cardboard tube over the speaker to make it produce a mellow rumbling note, it sounds like a hot, big-block Chevy with lots of cam (just the excuse those R/C police cars need to pull you over!). Well, now it looks good, runs well and sounds good; is it the ultimate street machine? Not until somebody comes along with a system to make the car smell as if it's running CAM2 racing gas. (You can smell that stuff in a car's

exhaust from a block away!)

Driving this car is the fun part. The Porsche India Red lacquer makes this car stand out in a crowd, and the beefy tires and neat wheels add the look of authority. The real fun starts when you throw the switches to start it up, as that wicked idle just about shakes the car. When you give it some throttle, the motor revs up the sound unit before the car starts to move—a satisfying, realistic effect. This is because the clutch is working, but it locks up quite quickly as the car begins to move out, and you have full power. You'll also notice that when you get off the throttle, the sound idles down as the car coasts with the clutch freewheeling. (Keep this in mind when you need to slow down—there's no motor braking!) The only thing missing is a scale stereo system. Hey, I wonder where that old pocket transistor radio is?

*Here are the addresses of the companies mentioned in this article:

Advance Engineering, P.O. Box 766,
Woodland Park, CO 80866.

Leisure Electronics, 22971 B Triton Way,
Laguna Hills, CA 92653.

Tower Hobbies, P.O. Box 778, Dept.
TH1001, Champaign, IL 61820.

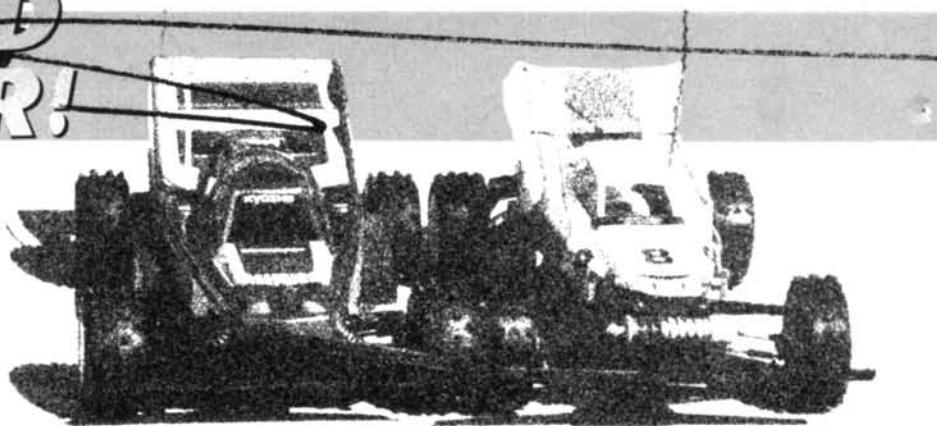
Robart Manufacturing, 310 N. 5th St., St.
Charles, IL 60174.

Robbe Model Sport, 180 Township Line
Rd., Belle Mead, NJ 08502.

OFF-ROAD THUNDER!

**The Boomerang
vs. the all-new
Kyosho Shadow.**

by MIKE LEE



4WD

BUDGET BATTLE

IN RACING, competition is everything, so when a spectacular new car hits the tracks, someone is bound to make another like it. We have *two* great budget cars that are so similar, we just had to arrange a shootout.

The match pitted the Tamiya* Boomerang 4WD off-road car against the newer Kyosho* Shadow 4WD. These are high-quality cars made for economical racers. Let's take a look underneath the hoods of these dirt-track killers to see what they have.

Both have a high-impact, plastic, tub chassis that fully encloses the radio gear. Both have shaft-driven 4WD transmissions with differentials, and they're mounted to the chassis tub. Both are mid-engine designs, with the motor just in front of the rear axle on the right of the car, and both have a 6-cell battery pack just under the car in front of the motor. Let's see what's *different*.

The Boomerang has a monoshock front suspension setup tied into twin A-arms. The shock has a single coil-over spring with adjustment collars, and this is helped by a single sway bar with adjustable links. On the front, the Shadow uses a more standard independent suspension with two coil-over shocks connected to twin A-arms. There's no sway bar



on the stock car.

Although both cars use planetary gear-type differentials, the Kyosho car seals the diff gears in a plastic housing, which prevents loss of grease from around the gears. For our tests, we installed ball bearings in both cars at all points. While the Shadow uses low-profile pin-spike tires on all wheels, the Boomerang uses the Tamiya block-and-point-style knobby tires, and the front tires are narrower than those on the rear, but still of the same diameter. The tires of both cars had identical measured circumferences.

At the rear, the cars have the same suspension setup: independent double-wishbone-type arms suspended by separate oil-filled coil-over shocks. Kyosho must be very confident about its shocks, as it doesn't provide any method



of coil-over adjustment, front or rear. Both cars use factory-supplied three-step speed controllers, although the Kyosho car now uses a much modified unit, which replaces the "arc-welder" speed controller of last year.

On top, the Boomerang has a two-piece body that nicely covers the chassis and nothing more. The Shadow has a larger one-piece body that covers more under the skirt, e.g., nerf bars. The rear wing is built into the Shadow body, while the wing on the Boomerang is mounted separately. Both cars are powered by a 540-size motor, which is the standard powerplant for almost all kit cars.

As you can see from the dimensions on the chart, the Shadow is slightly wider, but it pays for that independent front suspension by weighing four more ounces than the Boomerang. The Boomerang has a shorter wheelbase and more ground clearance, but both have the same size tires. To see what these two dirt wizards have for guts, we headed to the track for speed testing.

Speed Testing

For this part of the shootout, we installed the kits' stock motors, ball bearings throughout and 6-cell Sanyo battery packs, but everything else was box stock. Our first test was the straight-line test, where we simply put the cars on the paved road to test their all-out speeds. The Boomerang reached 14.5 mph, and the Shadow tailed it slightly with 13.5 mph. Both were equipped with 16-tooth pinion gears, and both tracked well, but did the familiar spiked-tire shuffle when oversteered on the pavement.

The radios are the basic pistol-grip radios, made for budget-minded drivers. Guiding the Shadow is the Kyosho Pulsar Pro 2000 radio, which is available for

under \$60. This radio features servo-reversing, a recharging jack for rechargeable upgrade and adjustable steering tension, and it's available on 75MHz. Guiding the Boomerang is the Hi-Tec Challenger 260 radio from Aristo-Craft. This unit has all the features of the Kyosho unit, plus adjustable trigger placement and over-torque steering-wheel protection for the heavy-handed. It, too, is available at just under \$60.

Dirt-Oval Performance

At the dirt track, we first charged around the oval course. Each car was given two sets of peaked

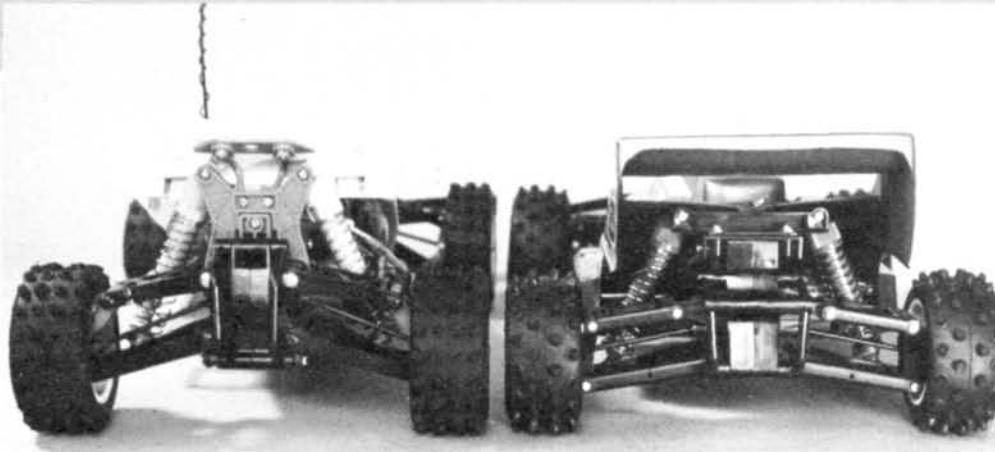


Photos by Mike Lee.

battery packs, and the average time for 10 consecutive laps was taken. If the sequence of laps was broken by a mishap (i.e., a crash), the laps were repeated.

Car	Avg. Lap Time	Fast Lap Time
Boomerang	11.72 sec. lap	11.16 sec. lap
Shadow	12.50 sec. lap	12.22 sec. lap

Now we can see what a mere 4 ounces does! The oval-track testing shows that the heavier Shadow



Boomerang (left) and Shadow (right). Both sport upper and lower A-arm independent rear suspensions and oil-filled shocks all around. The Boomerang has better ground clearance, but the Shadow has wider track for better lateral stability.

BASIC DIMENSIONS

Dimensions	Boomerang	Shadow
Length (overall):	15.25 inches	15 inches
Wheelbase:	10.125 inches	10.3 inches
Wheel Track (Front):	9 inches	9.5 inches
Wheel Track (Rear):	9 inches	9.5 inches
Wheel Diameter (Front):	3.25 inches	3.25 inches
Wheel Diameter (Rear):	3.25 inches	3.25 inches
Ground Clearance		
Front:	1 inch	.75 inches
Rear:	1.5 inches	1.3 inches
Weight:	3 pounds, 6 ounces	3 pounds, 10 ounces

trails the Boomerang by an average of about three-quarters of a second per lap. In a four-minute race, that equals a whole lap. We also noted that the LeMans 05 Stock motor from the Shadow kit didn't have torque in the corners, but the standard 540 motor in the Boomerang kit did. We heard the Shadow straining through the oval turns, and it had to re-accelerate down the straights.

On the oval, we proved a couple of things about the handling of this pair. The Boomerang had pronounced tail sway in the corners, so the driver had to pulse the steering wheel to hold it straight. As a result, several times, the car suddenly dived for the inside of the track as it oversteered. The Shadow, on the other hand, stuck pretty well, apart from when we missed the corner slightly and brought the wheel hard into the corner. This revealed the Shadow's understeering, as the car neatly drifted across the track towards the wall! Although this might be cured with slightly increased turning authority from the servo, the car never really suffered from understeer.

Road-Course Performance
The road course was the next testing ground. Here, we again averaged the lap times and posted the best time as shown here:

Car	Avg. Lap Time	Fast Lap Time
Boomerang	22.57 sec. lap	20.81 sec. lap
Shadow	22.01 sec. lap	20.32 sec. lap

Wow! Look what happens on the road course when a car has wider wheels and a

longer wheelbase! The Shadow shows that it can handle the twisty stuff half a second faster per lap than the Boomerang. The Shadow's lower center of gravity also contributes to its better handling and better track times. No doubt about it, the Shadow did bottom out a lot more on the jumps than the Boomerang did, but not enough to damage the car during our tests.

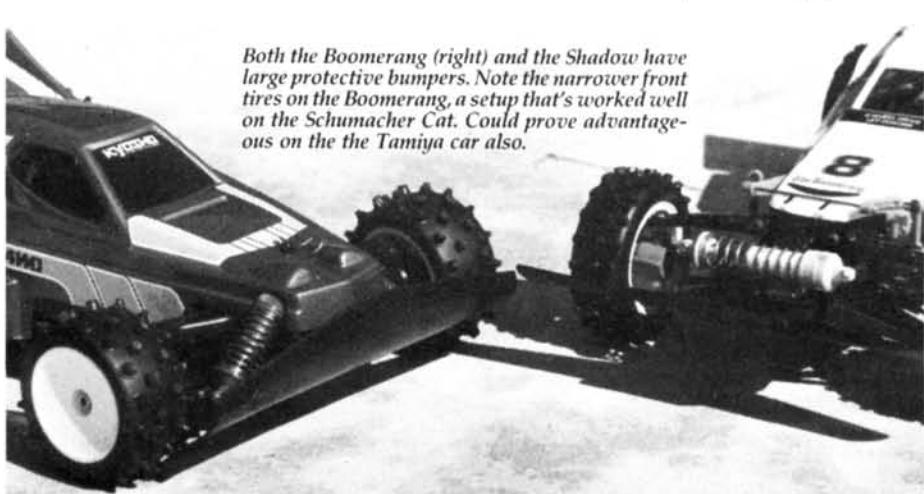
The Shadow handled better on the course, going more smoothly over the jumps and through the tighter turns. Both cars seemed to nose-over just a little on the jumps, but never enough to cause an end-over resulting in a crunch. With its faster steering rate, the Boomerang gave me the impression that it could be flicked around whenever the occasion called for it. However, racing experience shows that a smoother-handling car will put in better track times, as the Shadow did.

So Which Wins?

I noticed one other minor detail in this series of tests: The Shadow, with its

(Continued on page 114)

Both the Boomerang (right) and the Shadow have large protective bumpers. Note the narrower front tires on the Boomerang, a setup that's worked well on the Schumacher Cat. Could prove advantageous on the Tamiya car also.



Troubleshooting

by FRED MURPHY

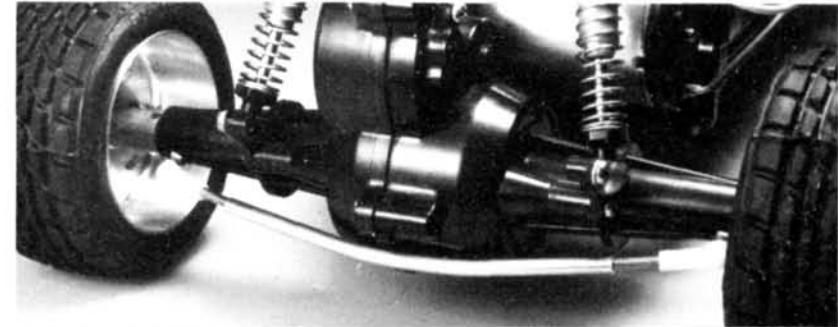
BEEFING UP THE HORNET AND GRASSHOPPER GEARBOX AND SUSPENSION.

IS YOUR FRONT END shaking? Is your gearbox slipping? If you've had your Grasshopper or Hornet for a while, you probably have one of these problems, if not both. As parts wear, especially those made of ABS/nylon, they don't fit as snugly as they did when they were new. When they don't fit properly, the excess "play" causes handling problems, steering problems and even gear-slipage problems, and these can only be solved by replacing them with new components.

However, even when these cars are new, they have play in the A-arms and steering, as well as side-to-side play in the differential. If this play can be limited from the day you buy your car, you'll get a lot more driving enjoyment before it reaches the point of complete slop. I'll describe the cure for this slop in this month's column.

Three areas of the Grasshopper and Hornet need to be addressed: the steering assembly, the A-arm assembly and the differential. All can be improved easily and economically, thanks to the innovative people at Miracle Speedway*. Whether your car is new or old, these simple, but effective, modifications will make a dramatic difference to its handling and performance.

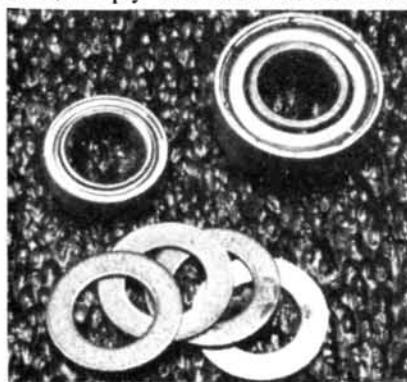
First the A-arms. No matter how old your car is, you'll notice vertical, horizontal and lateral play in this assembly. The A-arm Steering Kit from Miracle Speedway is designed specifically for this assembly. The kit provides four A-arm bushings that fit onto the pivot ends and take up any slop in the assembly. If your car is new, you might have to do a small amount of trimming on the chassis, but if, like my Hornet, your car is well used, the bushing kit fits perfectly with no trimming, and when re-assembled, the A-arm assembly is better than new. The front



Gearbox strengthening kit not only prevents gearbox separation but also helps protect the bottom of the assembly.

end will be devoid of the wobbling and shaking that are major causes of handling problems in the Grasshopper and Hornet.

Make the A-arm Steering Kit even more effective by adding the Heavy Duty Steering Kit from Miracle, and the entire front end will be secure. This kit includes four hardened-steel balls and heavy-duty nylon ball ends, all of which are held together with stainless-steel tie rods. To install, simply drill four $\frac{3}{32}$ -inch holes



The Bulletproof Diff Kit includes the spur-gear bearings for optimum, friction-free performance. Specially designed axle shims are the key to minimizing axle shaft side-to-side play.

and, in minutes, your steering is tight and ready for the worst terrain. This is a quick, simple and long-term fix—and you don't have to buy an entire front end for your car.



A-arm pivot-point bushings will rejuvenate your front suspension. Note heavy-duty steering rods for extra handling performance.

The next area to contend with on your Grasshopper or Hornet is the side-to-side play of the differential. (I've never seen a Hornet that didn't have this movement.) When the gear assembly begins to wear, this play becomes more dramatic and causes slippage of the bevel gears, which leads to poor differential action and worse. The other problem arises because the rigid live-axle design of the gearbox is extremely stressed when the car jumps and runs on rough off-road conditions. This stress may cause the gearbox to flex at the assembly points, and could lead to

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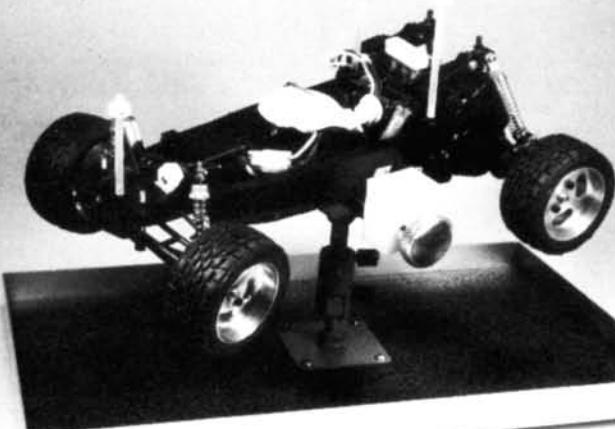


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TROUBLESHOOTING



The Steady Lift II provides a second set of hands that make repair and assembly jobs easy.

gear and gearbox separation. This, in turn, could lead to major gear stripping and permanent damage. Solutions to these two problems have been thoughtfully provided by Miracle Speedway, with the introduction of the Bulletproof Differential Kit and the Gear Case Strengthening Kit for the Grasshopper and Hornet. First, the Differential Kit eliminates the side-to-side play and dramatically decreases axle and play, gear lash and gear wobble. This will stop gear slippage, and will also allow you to use the hot, modified motors and 7-cell packs that would beat a stock Grasshopper or Hornet diff to death.

The Gear Case Strengthening Kit will protect your gear case from being broken or separated during jumps and will also act as a great bottom support for the case when running on rough surfaces. Once again, it's a simple, economical and surefire way of preventing excess wear and tear on our cars.

All the Miracle Speedway components take no longer than 30 to 45 minutes to install, and they remove all slip and slop

from your car. And if you have a car stand, like the Steady Lift II from Lightning R/C Products*, it's like having an extra set of hands to work for you. This is the most versatile car stand I've ever used. You can turn the car 360 degrees and even tilt it at a 45-degree angle for easy access to any part. I installed the Miracle Speedway components using the Steady Lift II, and never had to remove the car (not even when I drilled holes on the bottom of the gear case to install the Strengthening Kit). You should consider this extra set of hands, the next time you're fumbling around with your car. By the way, it even has a catch tray for all the parts we drop when our fingers get slippery at the track.

So, get out the slip and slop. Good luck and happy motoring!

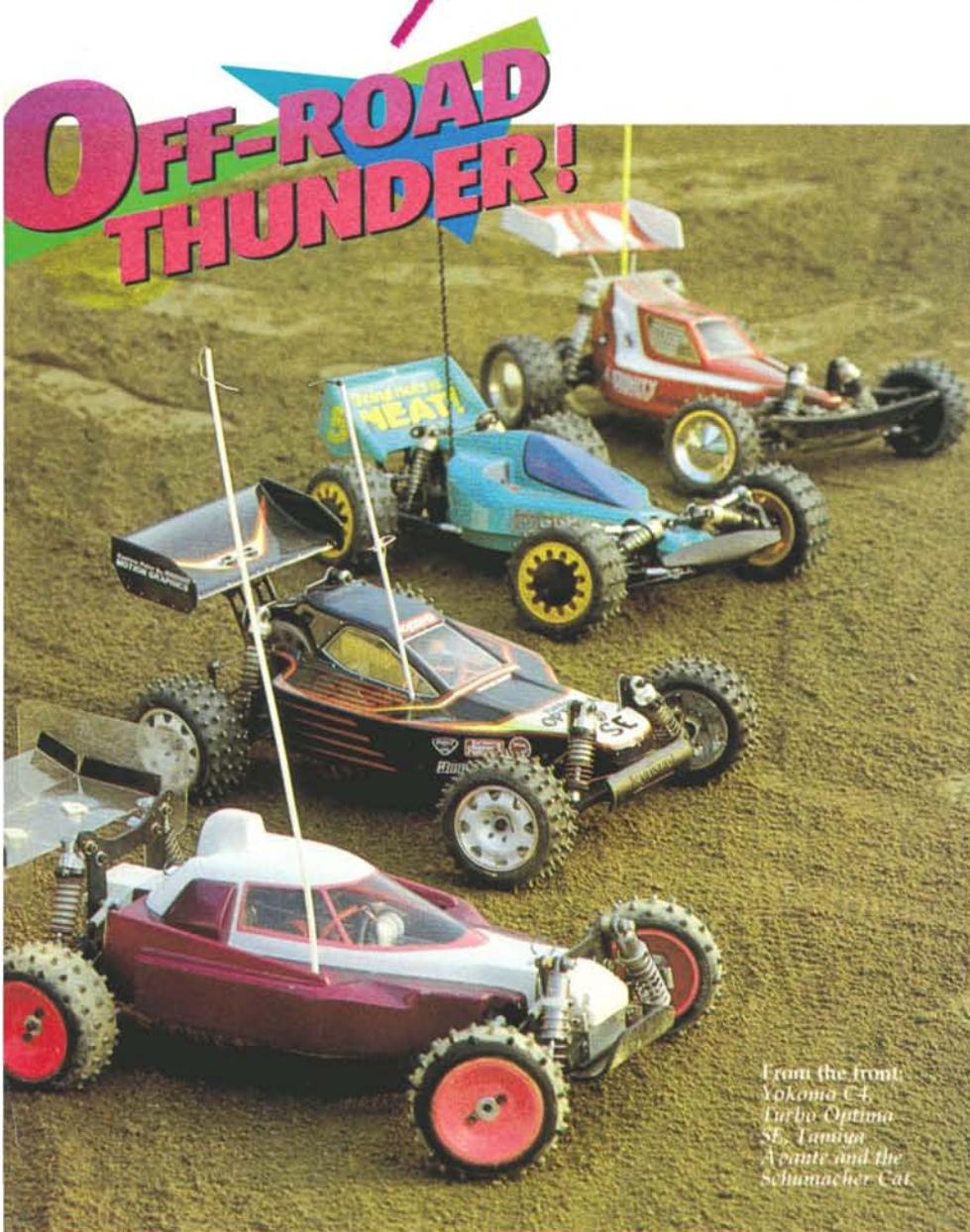
*Here are the addresses of the manufacturers featured in this article:

Miracle Speedway, 300 Pheasant Dr., Kalispell, MT 59901.

Lightning R/C Products, 17123 Seven Pines, Spring, TX 77379.

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KYOSHO

TURBO OPTIMA MID SE

Type 4WD off-road
 Scale 1/10
 Sug. Retail Price \$379.95

DIMENSIONS:

Overall Length 14 inches
 Width 10.5 inches
 Height 5.75 inches (w/o wing)
 Wheelbase 10 inches
 Front Track 9.25 inches
 Rear Track 9.5 inches

WEIGHT:

Gross (w/bat.) 3 pounds, 7 ounces
 Balance 47/53

BODY:

Type Single-seater
 Material Polycarbonate

CHASSIS:

Type Plate
 Material Aluminum

DRIVE TRAIN:

Type Rear gear-drive with
 belt front assist

Differentials Ball (f/r)

SUSPENSION:

Type (f/r) Lower A-arm w/upper rod
 Dampening (f/r) Oil-filled coil-over
 left and right

TIRES:

Front Spike
 Rear Spike

ELECTRICAL:

Motor Reedy Ultrastock
 Battery Reedy matched Sanyo SCR
 Speed Controller ... Tekin ESC 190 Pro

4WD SHOOTOUT

by STEVE POND

IF YOU ASK FOUR PEOPLE, "Which is the best 4WD off-road car?" you may get four different answers. To determine what our readers want, we only have to read their daily pile of letters. The aforementioned question is frequently asked, so here's the answer! We decided to test the four hottest 4WD cars: the Schumacher* Cat XLS, the

Yokomo* C4, the Kyosho* Turbo Optima Mid SE and the Tamiya* Avante. Each car has been very successful at local and national races, so to find

out which is really the best, we equipped each car with identical motors, batteries and speed controllers, and then put them head-to-head.

Before any testing, each car was equipped with a Reedy* Ultrastock motor, Reedy Matched Sanyo SCR cells and a Tekin* ESC 190 Pro speed controller. By using virtually identical equipment in all the cars, no car had a power advantage, and this allows us to

HERE'S THE WINNER NOW YOU KNOW!

MRC/TAMIYA

AVANTE

Type 4WD off-road
Scale 1/10
Sug. Retail Price \$415.95

DIMENSIONS:
Overall Length 16 1/4 inches
Width 9 1/2 inches
Wheelbase 10 1/4 inches
Front Track 7 3/4 inches
Rear Track 7 3/4 inches

WEIGHT:
Gross (w/bat.) 3 pounds, 12 1/2 ounces
Balance 35/65

BODY:
Type Aerodynamic buggy w/undercowl
Material Lexan

CHASSIS:
Type Double plate
Material Fiberglass composite

DRIVE TRAIN:
Type (prim./sec.) Spur gear/Shft
Differentials Center ball-type

SUSPENSION:
Front: Type Double wishbone
Dampening Oil-filled coil-over
Rear: Type Double wishbone
Dampening Oil-filled coil-over

TIRES:
Front Low-profile pin-spike
Rear Low-profile pin-spike

ELECTRICAL:
Motor Reedy Ultrastock
Battery Reedy matched Sanyo SCR
Speed Controller Tekin ESC 190 Pro

SCHUMACHER

CAT XLS

Type 4WD off-road
Scale 1/10
Sug. Retail Price \$350

DIMENSIONS:
Overall Length 14 5/8 inches
Width 9 5/8 inches
Height 5 inches (w/o wing)
Wheelbase 10 3/4 inches
Front Track 8 1/4 inches
Rear Track 7 3/4 inches

WEIGHT:
Gross (w/bat.) 3 pounds, 8 ounces
Balance 44/56

BODY:
Type Single-seater w/lower chassis pan
Material Lexan

CHASSIS:
Type Plate
Material Fiberglass

DRIVE TRAIN:
Type (prim./sec.) Belt/Belt
Differentials Ball (f/r)

SUSPENSION:
Front: Type Double wishbone
Dampening Oil-filled coil-over
Rear: Type Double wishbone
Dampening Oil-filled coil-over

TIRES:
Front Spike
Rear Spike

ELECTRICAL:
Motor Reedy Ultrastock
Battery Reedy matched Sanyo SCR
Speed Controller Tekin ESC 190 Pro

YOKOMO

C4

Type 4WD off-road
Scale 1/10
Sug. Retail Price N/A

DIMENSIONS:
Overall Length 14.4 inches
Width 9.61 inches
Height 4.25 inches
Wheelbase 10.66 inches
Front Track 8.15 inches
Rear Track 8.15 inches

WEIGHT:
Gross (w/bat.) 3 pounds, 9 ounces
Balance 45/55

BODY:
Type Single-seater w/undercowl
Material Lexan

CHASSIS:
Type Saddle-pack plate
Material Fiberglass

DRIVE TRAIN:
Type (prim./sec.) Spur/Belt
Differentials Ball-type (f/r)

SUSPENSION:
Front: Type Lower A-arm/upper rod
Dampening Oil-filled coil-over
Rear: Type Lower A-arm/upper rod
Dampening Oil-filled coil-over

TIRES:
Front Hot Laps knobby
Rear Hot Laps knobby

ELECTRICAL:
Motor Reedy Ultrastock
Battery Reedy matched Sanyo SCR
Speed Controller Tekin ESC 190 Pro

bring you the most comprehensive report possible.

Features

- Cat XLS:** The Schumacher Cat XLS is a belt-driven 4WD with fiberglass upper and lower chassis plates; mid-motor mounting position; double-wishbone suspension, front and rear, dampened by oil-filled coil-overs on all corners; front anti-roll bar; universal-joint driveshafts for each wheel with one-way bearings in both of the front shafts; ball differentials at both ends; a complete set of sealed ball bearings; a "break-away" front end that allows the entire left or right suspension assembly to pivot in the event of a hard collision; and a Lexan body with an undercowling to keep the innards as clean as possible. The kit doesn't include a motor or a speed controller.
- C4:** The new Yokomo C4 is quite a departure from the original Dogfighter. It has many improvements, including a fiberglass chassis cut for saddle packs; mid-motor mounting position (as on the old Dog); four-wheel independent suspension with adjustable upper



The BORRA track in Bethel, CT. was the test site.

arms; oil-filled coil-overs front and rear; universal-joint dog bones on all four corners; full ball-bearing set; magnesium bulkheads that house the ball differentials front and rear; front and rear belt drive with a centrally located torque limiter and one-way bearing driving the front differential; and a Lexan body with an undercowling for clean operation. Once again, this kit comes without motor and speed controller.

• **Turbo Optima Mid SE:** The Kyosho Optima Mid is the car that brought Kyosho into the winners' circle. This new, updated version—dubbed the Turbo Optima Mid SE—has many of the features of the aforementioned cars, including upper and lower chassis plates (the lower plate on the Mid is a narrow aluminum plate); four-wheel independent suspension with adjustable upper arms; front universal-joint dog bones and standard rear dog bones; front and rear ball differentials connected by a metal reinforced belt; front and rear anti-roll bars; torque-limiter assembly on the spur gear; Platinum oil-filled coil-overs, front and rear; a full set of ball bearings; and a standard single-seater Lexan body. This kit also includes Kyosho's new heavy-duty rotary speed controller and a LeMans 240 ST motor.

• **Avante:** Tamiya's new Avante is the company's boldest effort at building a competitive off-road racing machine. I don't want to sound like a parrot, but the Avante also includes fiberglass upper and lower chassis plates (these sandwich a centrally located ball differential that handles the chores for both the front and rear gear diffs); a shaft-driven front end; spur-type front and rear gear differentials; universal-joint front dog bones; standard rear dog bones; upper and lower adjustable-link rear suspension and lower A-arm/upper-link front suspension with radius rods on all corners dampened by oil-filled coil-overs; inline mid-motor mounting; knock-off wheel hubs; and a Lexan body with undercowl. The Avante is available either with a Tamiya Technigold motor or without.

Assembly

Ease of assembly and maintenance were important to our evaluations, because they determine how much track time and enjoyment an average racing enthusiast will reap from his or her purchase.

• **The Schumacher Cat:** This is the most difficult of the bunch to assemble. Although the number of parts isn't extremely high, some parts have to be modified for proper fit and smooth operation. Some may say that this is to be expected with some kits and that minor modifications are always necessary to obtain maximum performance from any car. However, when these modifications aren't clearly outlined in the instruction manual, as is the case with the Cat's less-than-explicit directions, the first-time builder must find someone with Cat experience, or finish it themselves, and this could turn out to be an expensive gamble. So if you want to join the elite club of four-wheelers and the Cat is your choice, enlist the help of a Cat veteran to help you through the assembly.

• **The Yokomo C4:** Although we at RCCA didn't build this, owner Greg Vogel (who agreed to let us use his C4 after we'd exhausted every possible avenue and still couldn't scare up the elusive Yoke!) explained that assembly is relatively easy, due to the simple design and low number of parts. However, he did have a problem with the tension of the rear belt: Out of the box, there's no way to adjust the tension of the rear belt, and during an initial bench test, he found that the belt jumped the pulley. To cure this and obtain proper tension, he slotted the holes in the chassis that the mounting screws pass through.

• **The Kyosho Turbo Optima Mid Se:** This brings home the award for easy assembly. Even though the assembly takes slightly longer than is usual, following the explicit instructions will net you a top-notch performer without having to go into the operating room. We had a problem mounting the electronics. (Well, no car is perfect!) Securely mounting anything other than the standard equipment on the rather slim, lower, aluminum chassis was quite a challenge. With the absence of the speed-controller servo, the receiver was squeezed in between the upper and lower chassis plates. The Tekin speed controller was mounted to the rear portion of the belt cover. When aftermarket equipment is used, this car would benefit from a wider lower plate.

• **The Tamiya Avante:** This closely follows the Cat for difficulty of assembly. We have a gut feeling that the



The two top contenders mixing it up: the Turbo Optima SE (foreground) and the Schumacher Cat XLS in the background.



The stock tires cost the C4 time, as they would often slide too much—sometimes into the soft stuff.



The electronics are consistent throughout. Pictured above are the four Tekin BC 100 competition peak chargers pumping up the new Reedy matched Sanyo SCR cells. All four cars were equipped with dyno-matched Reedy Ultra-Stock motors and Tekin ESC 190 speed controllers.

(Continued on page 66)

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SCOPING OUT

(Continued from page 38)

these aren't covered:

- Reverse-polarity battery hook-up
- Reversing the motor and battery leads
- Not insulating connections properly
- Shorting the heat sinks to other wires

This holds true for all electronic speed controllers, so great care must be taken, and the wiring diagram supplied with the controller should be followed exactly.

If this article has piqued your interest in changing from a mechanical controller to an electronic one, you should now consult some back issues of *RCCA* and the "Scoping Out" articles. We've tested several speed controllers, and you'll be able to determine which one will suit your needs. If you're unable to obtain the back issues from a store, you can use the order form usually found in the magazine.

*Here is the address of the manufacturer featured in this article:

Tekin Electronics, Inc., 1027 Trepadora,
San Clemente, CA 92672. ■

4WD SHOOTOUT

(Continued from page 64)

Avante could be just as stout a performer with far fewer parts. There are many fasteners on the car that require a thread-locking compound, and those that can't use a thread-locking compound, e.g., the suspension links, which must remain free for adjustment, constantly vibrate loose, causing owner stress convulsions (just kidding!). The Avante's only saving grace is that, as with all other Tamiya kits, it includes a superb instruction manual.

Performance

Before taking the cars to the track, each of the batteries was pumped with 9 amps of current (the recommended dosage for SCR cells!) supplied by the new Tekin BC100 peak-detection charger. Initial testing determined the best gearing combination to get each of the cars around the track as quickly as possible. Starting with a lower gear and a good selection of Robinson Racing Machines* spur and pinion gears, for each run, another tooth was added to the pinion, until lap times began to fall off and acceleration faltered because of over-gearing. Even with the taller gearing, the Reedy SCRs were able to consistently push the cars past the five-minute mark, so run time wasn't a consideration. When the cars' suspension and gearing had been dialed, they were put to rest for the impending duel.

(Continued on page 72)

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RODENT REVIVAL

by ERIC GOLDSCHRAFE



FOR ANY DRAG-RACING fan, the Sportsman class has appeal, but the *real* stars are the "Prostalgia" cars. These radical, tube-chassied, slightly scaled-down hot rods come close to being funny cars, but they usually run on carburetors and gasoline. These craftily re-styled '50s bodies are subtly chopped, channeled, streamlined and narrowed, but they still look like '55 and '57 Chevys and Fords. (A '58 "Christine" Plymouth is on the way!) Under the fiberglass nose work lurks big-block power—

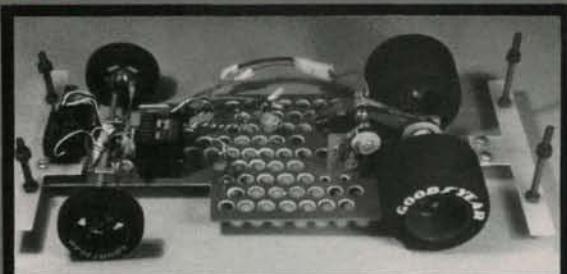
The Rat's Back— For The Quarter-Mile Traps!

usually more than 600 cubic inches—topped by ram-type manifolds, that are often fitted with elaborate nitrous-oxide setups. The doors work, and the paint jobs are usually as outrageous as the machinery. What does all this do for the fans? How about elapsed times of less than seven seconds, at speeds in the 200mph range?

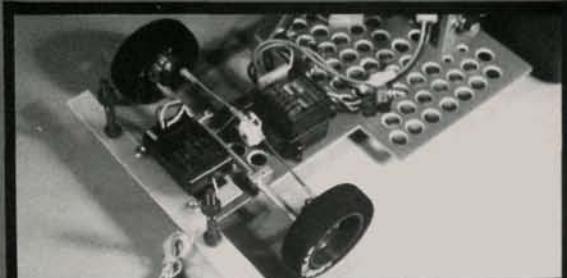
To make something like this in $\frac{1}{10}$ -scale isn't difficult from an electrical and mechanical standpoint, but I wanted it to look like the real thing. There isn't much you can do to rework the Lexan body shell without ruining its appearance, but if you cut away some of the lower portion, the car will sit lower and have a somewhat smaller front. It's easy to go overboard and to lose the "stock" appearance, but I cut off about $\frac{1}{2}$ inch all around, and this '57 still looks like an unmodified shell. The bright red paint job is a little plain for cars of this type, but I felt that a more flamboyant color scheme might look less "classic." The name "Rug Rat" will ring a bell with regular readers, and the reasons for the name are still the same: It's a big-block Chevy ("rat motor") and it runs on a carpeted surface. (The "launch pad" at Island Raceway in Central Islip, NY, is carpeted.) An Advance* Pro-Stock hood scoop sits in front of the windshield, and at the rear, a Parma* off-road wing has been trimmed down slightly to make the large and characteristic spoiler. The large lettering was hand-cut from Top Flite* MonoKote trim sheet material, and the rest is a mix of pre-printed manufacturers' decals, Coverite* graphics, and Autographics* alphabet sheets.

Underneath the tricked-up body is an all-out competition chassis, and the main framework is fiberglass. This piece was hand-cut to fit under the body and within the power train requirements, and then liberally drilled to reduce weight. This unit has some flexibility, and this provides for super traction on hole shots. The big slicks had to fit inside the body lines, and this was easily accomplished by using the complete Advance dragster/funny car belt-drive rear-end assembly, which easily bolts directly to the chassis. It also allows for some unreal "gear" ratios for great acceleration—without the hassle of gear adjustments. An Astro* Turbo motor was bolted to the rear-end unit,

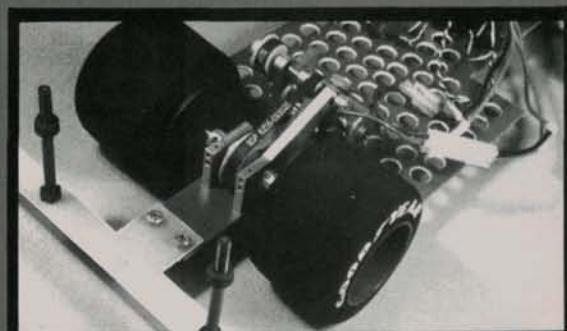
(Continued on page 132)



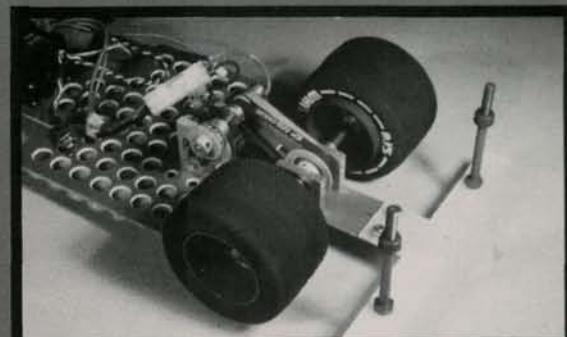
Overall chassis layout of drag Rat shows use of Advance Engineering mechanical components and "Swiss-cheesed" fiberglass chassis plate. Note dyed wheels and BoLINK body-mount posts.



RRII's front end has drag Zeta speed control Velcroed to steering servo; receiver is mounted in front of axle.



Advance dragster/funny car belt drive is used to get tires closer together and get lower gear ratio.



Chassis flexes enough for super traction on acceleration; Astro turbo motor gives plenty of tire-smokin' torque!

4WD SHOOTOUT

(Continued from page 66)

ALL NEW! PROVEN! ■ Aircraft Aluminum ■ Competition 2WD and 4WD Chassis



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This chassis kit fits the Super Shot, Boomerang, Super Sabre, Hot Shot I & II, and Big Wig. It's a lightweight aluminum plate that eliminates the black tub and makes the car very serviceable. It has front and rear shock adjusters and two side rails to help stiffen the assembly. This kit makes these cars much more competitive.

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The shootout took place at the BORRA track in Bethel, CT. Helping with the chores of battery charging, maintenance and some driving was the club's President, John Gallager, and members Frank Massi, Dave Knapp, Ron Vitti, Billy Ochs, and the Vogel trio of Al, Greg and Jeff. During the weekend, each driver ran the cars with one goal in mind—fast laps.

At the bottom end of the final results was the Tamiya Avante with a lap average of 14.58 seconds. Excessive weight took its toll on acceleration and, despite suspension adjustments, its erratic handling prevented it from turning consistently fast laps. A couple of fast laps in the low-to-mid 13-second range proved that the Avante was capable of good speed under ideal conditions, but poor handling wouldn't allow it to reliably maintain these speeds. One of the Avante's most serious problems is its suspension geometry. The front suspension has very limited travel, and this,

(Continued on page 94)

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An innovative device for keeping track of all your 64 or 32 pitch gears. The caddy mounting pins are chronologically arranged to allow the racer quick and easy access to the gear desired. Also comes with custom number decals ("8" through "37") for labeling the Caddy. Suggested retail: \$8.50 PART NO: 0020



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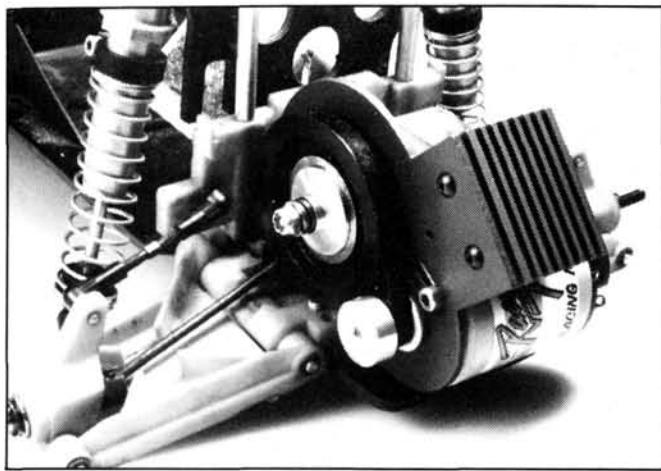
integrity—excellent for concours competition too! These rims can be mounted from the front or rear and work on all popular 1/12 scale cars. Centerlines are available in White, Chrome and Gold Chrome. Suggested retail: \$3.95, \$5.95 and \$6.95 respectively.

PART NO: W/C/GC-014

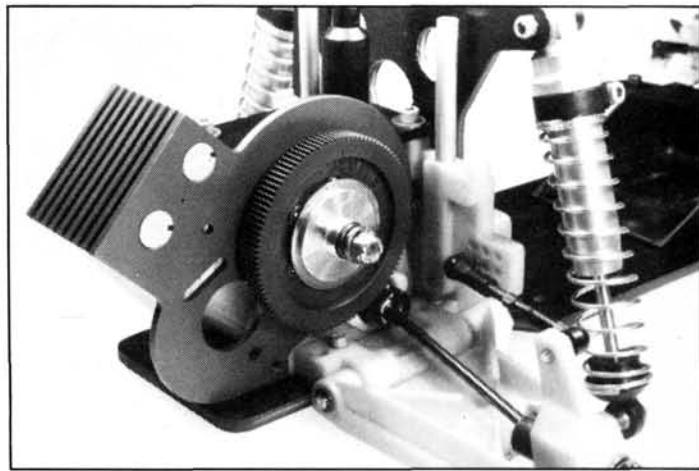
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Left View Hyperdrive conversion complete on RC10. Note diff and motor flipped 180 degrees with the aid of Litespeed's heat sink motor plate.



RC10 before "Hyperization" with Litespeed heat sink in place. **Right View**

HYPERRIVE CONVERSION

by STEVE POND

Give your RC10 a good belt!

OF ALL THE variables affecting the performance of an R/C car, e.g., track conditions, tire selection, motors, etc., one element remains relatively constant: the battery's limited ability to provide power for a certain length of time. Another variable that will affect your car's performance is how efficiently power is transmitted from the motor to the ground. If more power is put to the ground, rather than consumed in transit, the results will be longer run times, faster speeds and quicker acceleration.

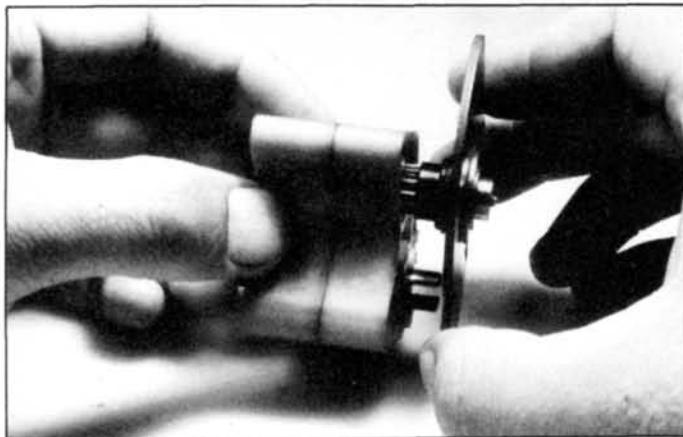
Since the inception of radio-control racing, racers and manufacturers alike have been trying to develop a more efficient battery. The drive systems

that have been developed (barring the internal workings of cars with transmissions), are mainly of the standard spur-and-pinion-gear type. Even this combination has taken many forms, including the original 32-pitch configuration and, more recently, 48 and 64 pitch.

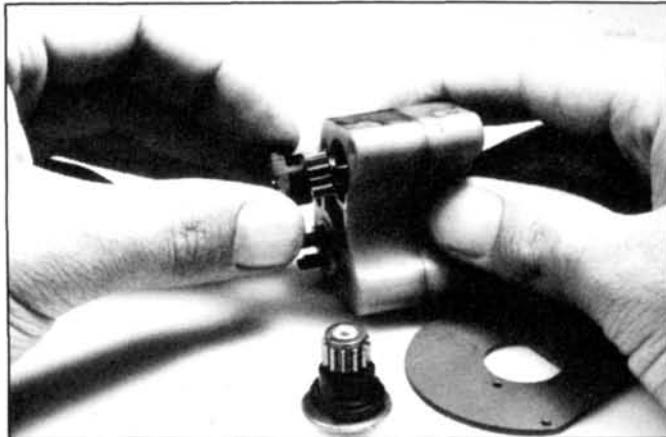
One of the latest developments in efficient power transmission is the new Hyperdrive from S.S. Industries*. The Hyperdrive is riding on the coattails of the belt-drive boom, and is seemingly effective in connecting front and rear differentials in 4WD cars. The Hyperdrive now enables a number of on- and off-road 2WD cars to run a belt as well.

Conversion to the Hyperdrive belt system is a

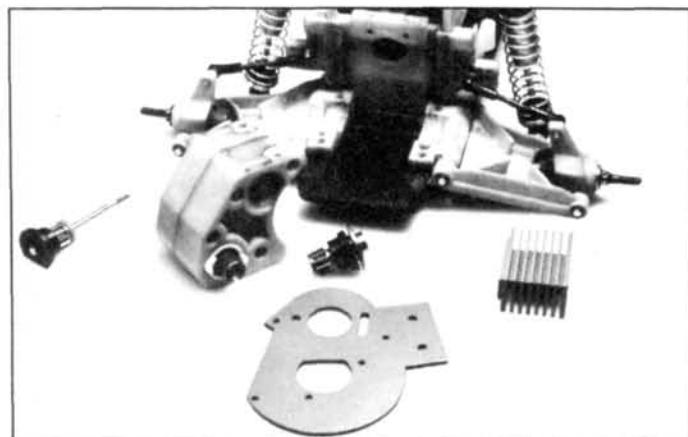
HYPERRIVE CONVERSION



1. To begin the conversion, loosen the screws that hold the motor-mounting plate and remove it along with the diff tube.



2. Next, remove the diff shaft. Be careful not to drop the thrust bearing inside the transmission.



3. With these parts removed, you can begin to re-assemble the trans with the diff on the opposite side to accommodate the Hyperdrive.

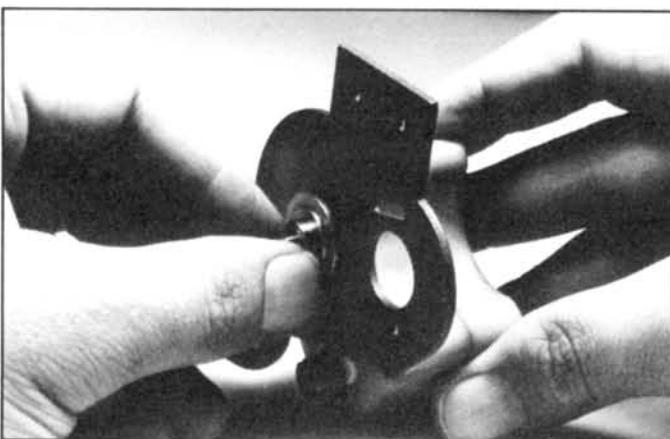


4. Press the diff shaft in on the opposite side where the diff tube assembly was originally located.

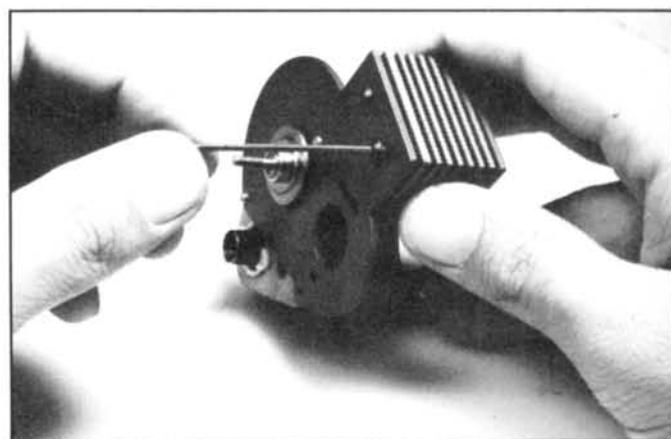
relatively simple operation for most competitive cars that use an integrated ball-diff/spur-gear assembly, although there's more to it than simply replacing the gear system with the belt. When using pinion and spur gears, the pinion spins counter-clockwise (as all motors are designed to do) to move the car forward. By separating these gears and adding a third member to connect them (in this case, a belt), the pinion and spur gears will now rotate in the same direction. Therefore, to use the Hyperdrive belt system, the rotation of the motor must be reversed for normal operation, and this can be accomplished in two ways.

The first method is to simply reverse the polarity of the motor. When reversing the polarity of modified motors, the timing must be moved to the opposite side of the zero point to

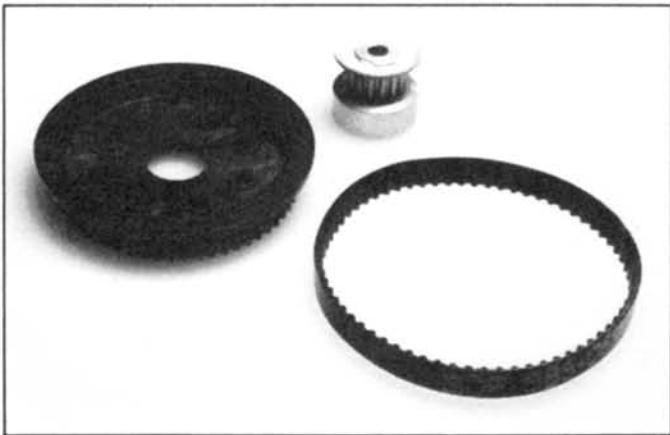
allow for timing advance. This may sound like an easy operation, but, if it isn't done properly, it could cause severe damage to your \$80 motor. When using stock motors, it isn't possible to reverse the polarity without a significant decrease in performance, because stock motors have a built-in timing advance. Unless you're able to rotate the end bell of the motor (which can't be done in the stock class because the end bell is sealed), the motor will have retarded timing when the polarity is reversed. Obviously this is *not* the way to go. The second (and *only*) way to perform this conversion without any of the aforementioned ill effects, is simply to move the motor to the other side of the transmission, if you're converting an off-road car. For cars *without* a transmission (i.e., most competitive on-road cars) moving the motor *and* the diff to the other side of



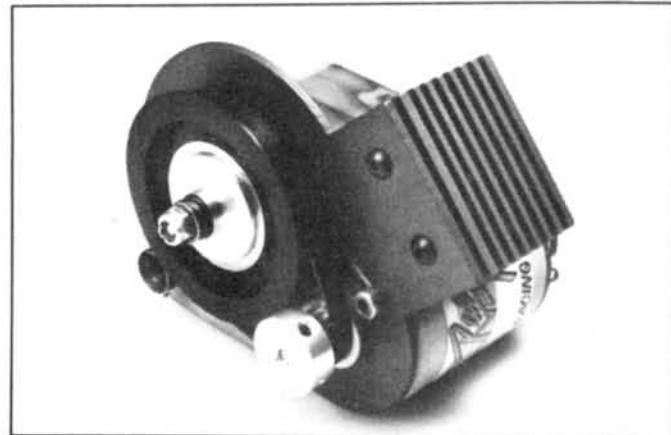
5. The mounting plate is placed between the diff tube and the bearing holder and is pressed into place.



6. The mounting plate is attached to the transmission with the three Allen-head bolts. Mount the heat sink on the plate over the motor location.



7. Transfer the diff balls to the Hyperdrive pulley, and install as you would the standard spur gear.



8. The conversion is now complete and ready to be mounted to the chassis.

the pod is the solution. Rotating the motor's mounting position 180 degrees produces the same effect as reversing the polarity. The rotation of the motor remains the same, but in relation to the spur gear (or belt pulley in this case), it's now opposite.

To convert the RC10 to the Hyperdrive system, start by removing the transmission from the car. You could perform the operation with the transmission still in place, but removing it might make the going a little easier. After removing the spur gear, loosen the three screws that hold the motor-mounting plate to the diff. Remove the plate along with the diff tube/gear assembly, and press the diff shaft and the bearing holder through the other side. After removing the three mounting screws and placing them through the diff from the other side, replace the diff shaft and bearing holder so it's now located

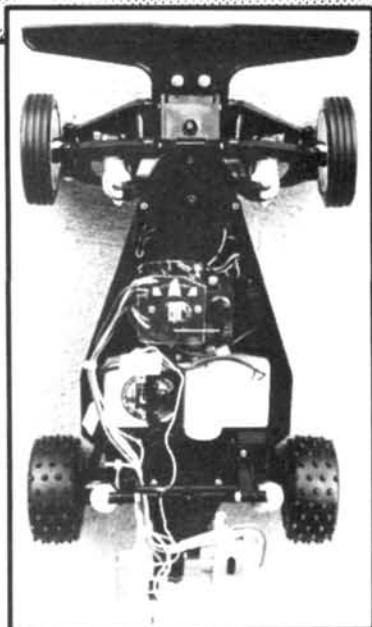
where the spur gear was in the stock configuration. Next, install the diff tube on the diff shaft as you usually would, but on the *other* side of the transmission. To complete the conversion, simply transfer the diff balls to the Hyperdrive belt pulley from the standard spur gear and attach the outer diff ring. All that remains is the proper selection of pulleys and belts for the ideal ratios.

In the second part of the Hyperdrive article, I'll bring you a comprehensive report on the Hyperdrive and how its performance compares with that of the spur-and-pinion-gear combination.

*Here is the address of the manufacturer featured in this article:
S.S. Industries Racing, Inc., 2109 Patti Ave., Springdale, AR 72764. ■

BUDGET RACER

by DICK BRINTON



This is the complete car, without body, but ready for tests. The bathtub chassis design does a good job in keeping out the dirt.

PART I

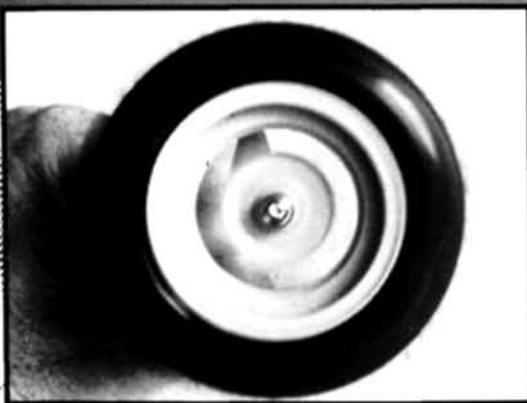
PROJECT FALCON SHARPENING THE TALONS

IN THIS ISSUE, I'll show you how to set up a budget racer from scratch. I used Tamiya's* Falcon, but this information applies to *any* car, so read on, and you'll learn to go from box stock to budget racer.

If you're in the market for a good budget racer that's easy to build, try the Falcon. Like more expensive cars, it has 4-wheel independent suspension (see the "Budget Racer" article on unsprung weight in the Nov. '88 issue of *RCCA*) is reasonably light, yet sturdy, and will accept some easy and helpful modifications.

If you're building the Falcon (or any other car), these tips may make the construction easier.

Whenever I have instructions that are written in several



A bad shake blurs the axle nut and the outer edge of the spinning rear wheel.

than 20 weight, and so on. You can mix a variety of weights to get the damping action you need. I'm experimenting now with 20-50, which is supposed to be more temperature-stable. I'll let you know.

Two of the most vital tools are pen and paper. When starting a new kit or re-thinking one you've already built, it's important to take notes as you go along. Here are some of the notes I made while constructing the Falcon:

- The damper oil used is 20 weight. (You have to know the starting weight in order to make the right changes.)
- The valves used in the dampers are the ones with the largest holes. (Tamiya supplies three valves per damper for different conditions.)
- The toe-in changes as the suspension compresses. (You need to set the correct toe-in at normal ride height.)
- The completed car weighs 2 pounds, 10 ounces, without the battery. (When you lighten the car, compare the finished weight with the starting weight.)
- Parma's* matched 6-cell pack weighs

1 ounce less than Tamiya's 6-cell pack. (In your quest for lightness, every ounce you knock off means faster acceleration and better cornering.)

- The lock nuts limit the spring/damper travel. (Anything you can do to add to spring/damper travel is a plus for handling.)
- The motor needs a dust cover. (Dirty

motors are less powerful motors, and they have a high failure rate. To finish first, you first have to finish!)

The car should be constructed according to the manufacturer's directions. It's generally not a good idea to start modifying before track-testing the car. I did, however, re-route the antenna wire away from the motor to lessen the chance of interference from motor noise. I also used



The motor needs a foam cover, or this cooling hole will collect motor-destroying dirt.

languages, I highlight the English version. This saves time and simplifies the whole project.

I use a ball driver instead of a regular screwdriver, although it's easy to strip plastic threads. Be very careful to avoid overtightening, and if you do strip a thread, try using Pacer's* Zap-Lock in the hole. According to Pacer: "Remove the screw, fill the hole with Zap-Lock, re-assemble and wait five to 15 minutes." I tried it, and it works!

Use the damper valves with the largest holes and adjust the damping by changing oil viscosity; i.e., 40 weight is thicker than 30 weight, which is thicker



The lock nut limits travel of the spring/damper unit by more than $\frac{1}{8}$ inch. Aftermarket replacements would be money well spent.

Trinity's No. 7088 bearing set, which replaces the nylon bushings in the transmission and at the wheels. Bearings really help any budget racer project.

Now it's off to the track to find out what the car does well, and what needs to be improved.

Since the track test is just that—a test—you'll need to structure it so that it provides the appropriate information. Consider what you need to know to set the car up for off-road racing, before you work on making it competitive on the oval track.

On the off-road track, there are turns in both directions: some tight, some sweepers. Most tracks have a jump or two, washboard sections and some ruts and bumps. You'll also need to check acceleration on the straights. Therefore, the car has to have good ground clearance, excellent spring/damper control, good balance (so it lands well after jumps), tires that grip under varied conditions, good balanced handling (without too much oversteer or understeer), and adequate acceleration and top speed.

When set up correctly, it should be easy to drive!

On the oval, there are turns in one direction only, and these are connected by straight stretches. However, even though the oval track is supposed to be smooth, you'll have to contend with some bumps here, too. In addition, as on off-road tracks, there may be multiple lines through the turns, so your car should be able to work in the inside and the outside grooves. A car set up for the oval doesn't need much ground clearance, and, while it does have to absorb some bumps without losing control, it doesn't have to be able to climb over a crouching elephant! But an oval car must have good balanced handling *for turning left* without too much oversteer or understeer. It should have excellent acceleration out of the turns and good straightaway speed, and it should be easy to set up and maintain the power slide used by dirt trackers. All this is a big order, and few cars (or drivers) are wonderful everywhere on the track.

To judge a car's handling, don't just throw it out onto the track and start to hot-lap. Pick a time when the track is empty and there are no distractions. Test the car three or four times on each section, and observe what the car wants to do under simulated racing conditions. For instance, if you're checking the handling in the sweeper at the end of the main straight, make sure your car is up to race speed when you enter the turn.

Here are some of my notes on the Falcon: (Incidentally, although it's difficult to see in the photos, the car does have an unpainted body. I haven't finished working on the paint scheme yet, but you'll see it in the next issue.)

"Section: Main straight, jump and sweeper. Acceleration good coming out of turn onto main straight. Rear suspension all used up on jump. Lands front first;



The tracks lead right off the track, showing bad understeer, or push.

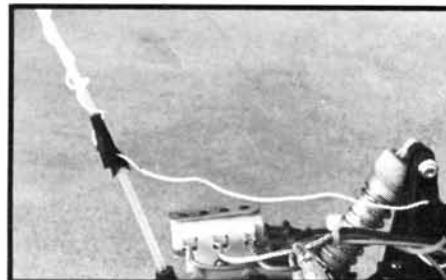
tends to veer sharply. Bad push (understeer) into sweeper. Will not hold line with power on. Must fix this."

From this short test (I ran it four times), you can see the rear suspension needs attention and, when fixed, will probably correct the sudden veering that occurs when the car lands. Bad understeer must be corrected, because the car won't track through the turns. It slides its front wheels sideways (even with full steering lock) and runs off the track. If your car can run fast down the straight, over the jump and through

the sweeper, you can do a lot of easy passing. If it can't, you'll be the one who's passed.

Conduct the tests on each section of your track. When you've finished, you should have a good idea of what your car does well and what needs improvement.

Then—and this is *really* important—make only one suspension change at a time. A simple tire change may correct more than one problem, or a change can make things worse. If you make several changes at one time, they may cancel



Re-routed antenna wire avoids possible interference from motor-brush noise.

each other out, and it's easy to get confused about what works and what doesn't.

Because of the bad push I've experienced with the Falcon, I'll first change the tires. I'll install a set of MRP* 35-4029 rib and knob fronts, then re-test. If they don't solve the push, I've developed a way to change the front camber. I'll also correct the bad out-of-balance condition of the rear tires.

Then I'll work on getting the car set up for the left-turn oval track. I'll explore this, and more, in the next issue of *RCCA*. In the meantime, test your car, with a little work, your budget racer can really haul! See you at the track.

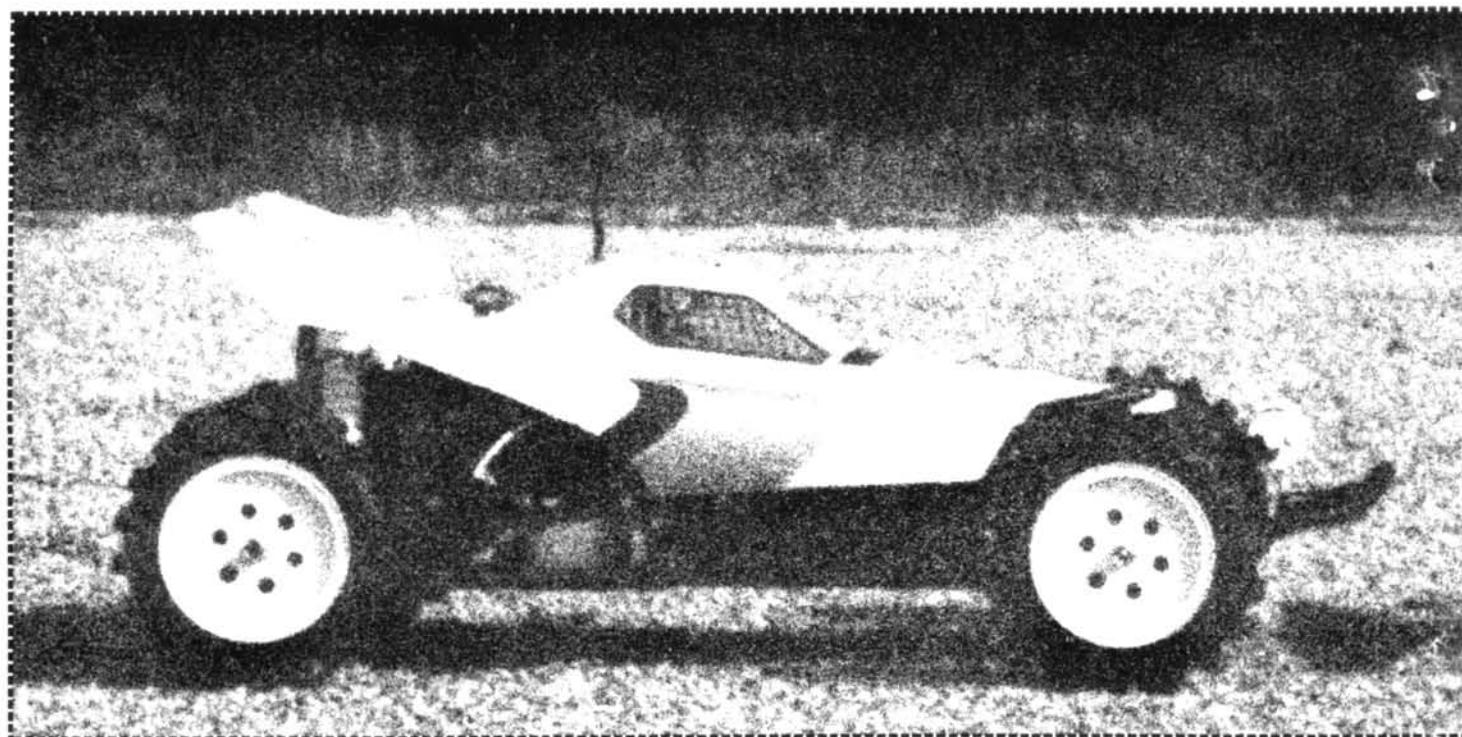
*Here are the addresses of the companies mentioned in this article:

MRC/Tamiya, 2500 Woodbridge Ave., Edison, NJ 08817.

Pacer Technology & Research, 1600 Dell Ave., Campbell, CA 95008.

Parma International, 13927 Progress Pkwy., North Royalton, OH 44133.

MRP, 18676-142 Ave., NE, Woodinville, WA 98072.



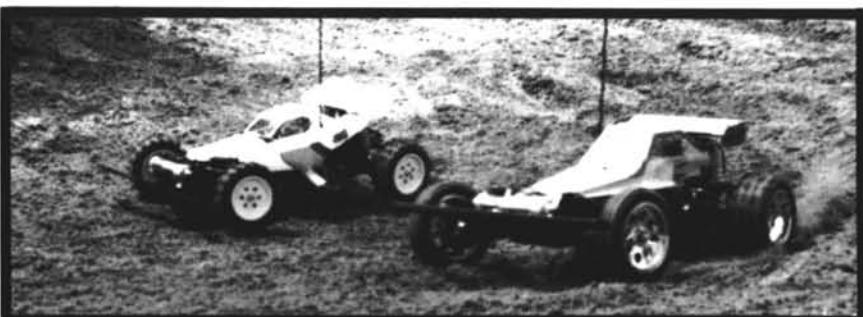
by TAI SUGAHARA

2WD VS. 4WD

SOME INSIGHT FOR THE ROOKIE OFF-ROADER

FIRST-TIME R/C car buyers usually ask "Which is better: a two-wheel-drive or a four-wheel-drive car?" Frequently, their main concern is being able to blow the doors off their friend's.....(you fill in the blank!). Unfortunately, it isn't that easy.

First, you have to consider how the cars will be used. If you plan on organized racing, your new 4WD "dirt blaster" will never have a chance to race against your friend's 2WD "wimpster," because 2WD cars and 4WD cars usually race in separate classes.



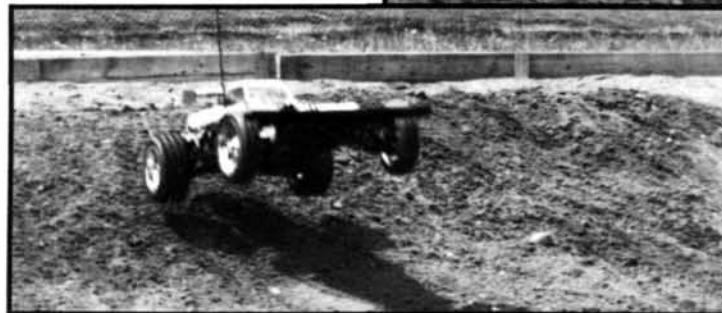
The 2WD Fox (right) and the 4WD Boomerang take the inside line—something 4WD cars are more adept at.



If you race in the back yard, through the grass and over the flowers (oops!), a 4WD usually has an advantage over a 2WD car. But how long will your races be? Whereas a 4WD with a stock motor may run six minutes through the grass, the 2WD might last nine minutes on a single charge. If races are limited to four minutes, the 4WD will come out on top. What if your buddy gets tired of losing in the back yard and heads out front to the driveway? If this happens, the 4WD is in trouble again (especially if there are long straights and few turns), as most 2WD cars have higher top speeds than similar 4WD cars.

Do you get the idea? The 4WD cars work better on rough stuff with lots of turns, but they generally don't run as fast or as long. And 2WD cars have more top end, run longer, and perform well on a course with long straights and few turns.

Which is the easier to drive? If the cars are set up properly (i.e., they run in a straight line, at speed, without you touching the steering wheel), the 4WD is definitely easier to drive. You have to work a lot harder to get a 2WD car around a racetrack. A stock motor-powered 4WD car can often be driven wide open through the turns; the driver only has to be concerned with



Top: Due to the extra mechanics in the nose of 4WD cars, they often lose their cool over jumps. Two-wheel-drive cars are usually more graceful in flight, as demonstrated by the Fox (left).

steering.

What about breakdowns? Don't 4WD cars frequently break down? It's true that the greater complexity of the 4WD can lead to trouble, but some 4WD cars are relatively simple. For example, the MRP* Shotgun has only six gears in its 4WD power train, which is the same number as Associated's* 2WD RC10. While other shaft-driven 4WD cars, e.g., the Kyosho* Shadow and Tamiya* Boomerang, have more gears, they're still good choices for beginners. You don't have chain stretching and adjustment problems with a shaft-drive system, and these cars don't need all sorts of tuning and adjusting to run satisfactorily on most surfaces. They may not be world beaters, but they can provide a good starting point.

It's easy to keep most 2WD cars running, and they don't
(Continued on page 116)



SELECTING OFF-ROAD TIRES

by JEFF PALMER

HAVE YOU EVER seen a driver at the track who looks as if he has raided the local tire store, and has enough tires to open a small store himself? You know, the one with 60 sets of tires for all occasions—knobbies, slicks, spikes, grooves and foams, etc. Most of his tires are failed experiments; fads that didn't pan out. He's searching for what

every racer is looking for—the tires that will provide maximum traction, yet have maximum control while cornering, i.e., tires that will *hook up* and put his car in the groove.

When I arrive at the track (especially if it's a track I haven't driven on before), I first walk around to inspect the surface.

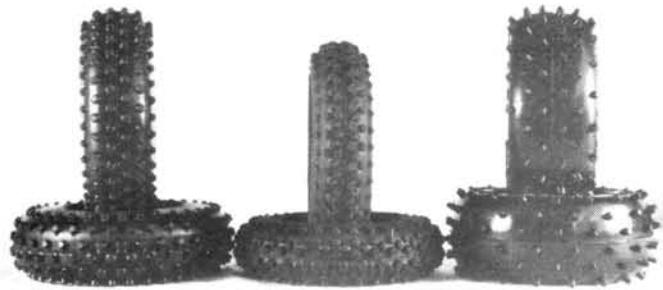
- Is the surface hard or soft?
- Does the surface dry out quickly, or does it hold moisture?
- If it dries quickly, is the surface covered with a thin layer of dust or loose dirt?
- Is the track smooth or rough?
- Is the track consistent all around, giving uniform traction?

While I'm "reading" the track, I try to find its "groove," as this tells me how I should drive it. The groove should provide the best overall traction and be the shortest

distance around the track. And don't forget to check the pit area to see what local drivers use. With all this information, I'm able to select suitable tires to start with, and from there I'll make changes to find the best tires for the track.

Interpreting the Track

Track hardness helps to determine the ideal width and hardness of your tires. The softer the track, the softer and wider your tires should be. This doesn't mean that a narrow rear tire on a high-traction soft track won't work; it means that you should *start* with a soft, wide tire on a soft track and adjust it accordingly. Dampness generally makes the track sticky, but beware, because on a damp track, dirt will stick to your tires. Closely spiked tires will collect dirt on a dry surface, but in wet dirt, they'll soon be clogged with mud, so increasing your rotational weight and decreasing the performance of the car and the tires. The greater the traction on the track, the smaller the spikes you'll need. On hard tracks, get as much rubber on the road as you need;



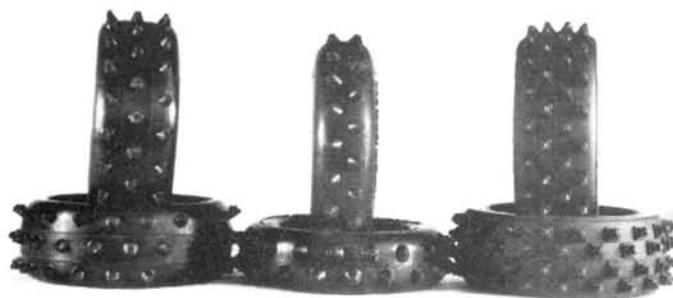
Left: Pro-Line 103f fronts give good bite on dry tracks, but will collect dirt if conditions are moist.

Center: The Pro-Line 420f fronts also give fantastic results on dry, hard surfaces but are even more susceptible to filling with damp dirt.

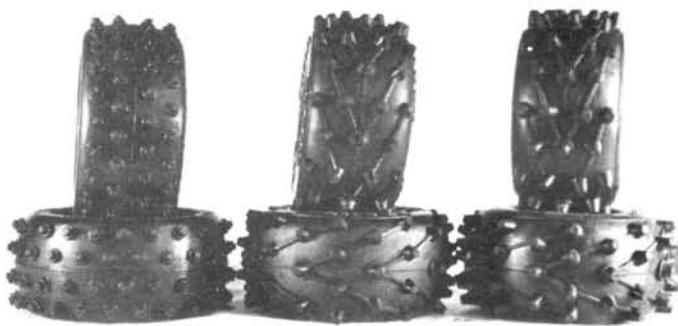
Right: Good reports are starting to come in about the Aristo 100-percent-rubber pin-spike rears.



Left: Kyosho Pyramid set the standard for 2WD traction. Associated improved on the Kyosho dynamics and made what many feel is the hottest 2WD rears to date—the TQ Series (right). The Schumacher 651s (center) have also proven themselves a force to be reckoned with.



For 2WD, some narrow fronts that provide good traction to keep "pushing" to a minimum without offering too much drag in the straights are the Schumacher three-row and two-row spikes, (left and center) and narrow version of the Associated TQ Series.



Like the Aristos, the Losi JR-X2s (left) are another tire to keep your eyes on. When all else fails, a good stand-by is the You-G V-spike tire (center). Troll V-spike is very similar but goes one better by offering the design in three different compounds. Keep these handy in your pit box.

use short spikes or block tires. Many R/C car tires are made of synthetic rubber or a combination of synthetic and natural rubber. When selecting tires for a hard track, start with all-natural rubber tires, as they usually provide the best traction.

A Brief Review of Handling

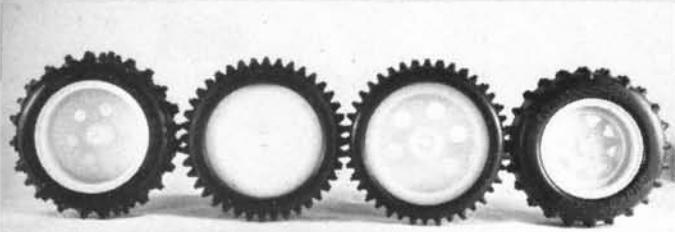
Tires are constantly shifting weight and adjusting to load changes. During acceleration, the weight is on the rear tires, but during braking, the weight shifts to the front. To the shifting-weight problem, add the dynamics of turning, where the weight is concentrated to the outside front and rear tires. The increased rear traction tends to overdrive the front tires, so forcing them to slide sideways and causing a problem known as "pushing." Pushing occurs in both 2WD and 4WD cars, but 2WD cars are known to push more.

You'll also have to consider tire "bite." Bite refers to the ability of a tire to cut into or grip the track's surface, and it's greatly affected by weight. Front-tire bite holds in turns and allows only minimum pushing, but it offers very little drag in the straightaways. Rear tire bite is the quality that will provide you with the best hole shot coming off the line, but doesn't over-drive the front tires when cornering. Weight being transferred to the ground is translated to pressure, and the smaller the surface area doing the transfer, the greater the pressure being exerted. In racing terms, the narrower the tire, the greater the pressure being applied to the ground. Now, let's apply this information to our cars and see which tires other racers are selecting.

2WD Cars

Racers want rear tires that will provide maximum traction but won't overpower the front tires during cornering, so causing push. Rear tires that give you a great hole shot may also overdrive the front tires and force you high and wide in the turns. A hole shot lasts for less than a second, but there will still be four more minutes of racing. Rear tires with a little less traction may do better overall, as they'll allow you to maintain a tight line in the turns. Kyosho* Pyramid tires (Gray Labels) set the standard for two-wheel traction with their tapered square spikes resting on a round block. Team Losi* has improved the Kyosho design with its Hot Laps series. Unfortunately, this series is no longer being produced, so go to your local hobby shop and buy them while you can. (I did.) At the 2WD Nationals, Associated* introduced what are now the hottest tires available—the TQ Series—another variation on Kyosho's Pyramid tire. TQ Series tires have square block bases with round spikes topping them off. They come in three degrees of hardness and allow you to adjust to different tracks without changing tread patterns. Start out with the medium tire and then adjust. The Schumacher* 651s are a reliable source of traction for the rear and shouldn't be overlooked.

Front tires for 2WD cars provide traction for cornering, but they also provide drag in the straightaways. Racers are looking for the best compromise: narrow tires that will corner well. Schumacher offers two and three rows of spikes (No. 655 and No. 653) and they work well on most tracks, giving adequate



Here's an example of high and low profile. The trend is to low profile, because they rebound less and allow the shock to do its job. However, some still go to higher profile if the track has many small stones on its surface. From left to right: The medium-profile Kyosho Pyramid, the low-profile Associated TQ and CRP Dynamite and high-profile Tamiya Off-Roader.

traction to prevent pushing. For hard tracks, use the Schumacher mini-spike tires, front and rear (No. 661 and No. 659). These tires provide great traction when cornering and minimum drag on the straightaway. Also, Schumacher tires collect less mud in very damp conditions. Other popular front tires are the Pro-Line* 103-f tires, which provide better bite on high-traction dry tracks, but collect dirt easily. The CRP* Dynamite mini spikes (No. 4223) provide excellent traction on tracks with firm surfaces. Keep an eye on Team Losi's new JR-X2s and Aristocraft's* pin-spike tires, as I've heard good reports about them.

4WD Cars

With 4WD cars, all four wheels provide power and braking. With this group of cars, there are two subgroups, or schools of thought:

- The Schumacher school: With the weight shift during acceleration, the rear tires provide the power and the front wheels cause drag. Limit the drag by using narrow front tires that corner well. This is more of a 2WD approach.
- The Yokomo school: All four wheels share more or less equal responsibility for acceleration and braking, so all four tires are of equal size. Use power to overcome any handling problems.

For Schumacher-style cars, the Schumacher Cat tires (No. 653, front; No. 651, rear) set the standard three years ago and have never been surpassed. The spikes are sometimes trimmed to improve their handling capabilities on high-traction tracks, but on hard tracks, the Schumacher 659s and 661s are the tires of choice. You'll occasionally find Kyosho Pyramid-style tires on the rear. In fact, most of the Yokomo cars now have Schumacher spike tires on the front, and Kyosho Pyramid-type tires on the



Many racers still trim the spikes on their tires for hard surfaces. The Schumacher 659 (left) and 661 (right) are the tires of choice for many racers.

rear. The Kyosho design comes in the same types as those discussed in the 2WD section.

Some Final Notes

Schumacher tires are good all-around tires, but watch for Associated TQs, as they're rapidly becoming popular for 2WD and 4WD cars. When all else fails, I like the general-purpose, You-G* V-spike tires; if you can't find them, try looking under the name of Panda, as the company is in the process of changing its name. Troll* makes excellent V-spike tires similar to those by You-G, but Troll makes them in three hardnesses, so they have a wider use. These V-spike tires will hook up when none of my other tires will—on soft and on sandy tracks. Try them. Where the rear tires are working well, but you need a little less traction, try mounting a front tire on a rear wheel rim. Till next time, good racing!

*Here are the addresses of the manufacturers mentioned in this article: Kyosho; distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Team Losi, 1655 E Mission Blvd, Pomona, CA 91766.

Associated Electrics, 3585 Cadillac Ave, Costa Mesa, CA 92626.

Schumacher; distributed by Trinity, 1901 E Linden Ave, #20, Linden, NJ 07036, and TRC, P.O. Box 478, Oakboro, NC 28129.

Pro-Line, 16466 Bernardo Center Dr, Suite 190, San Diego, CA 92128.

CRP, 3250 El Camino Real B-3, Atascadero, CA 93422.

Aristo-Craft/Polk's, 346 Bergen Ave, Jersey City, NJ 07304.

You-G/Panda; distributed by Varicom Industries, 18480 Bandelier Cir, Fountain Valley, CA 92728.

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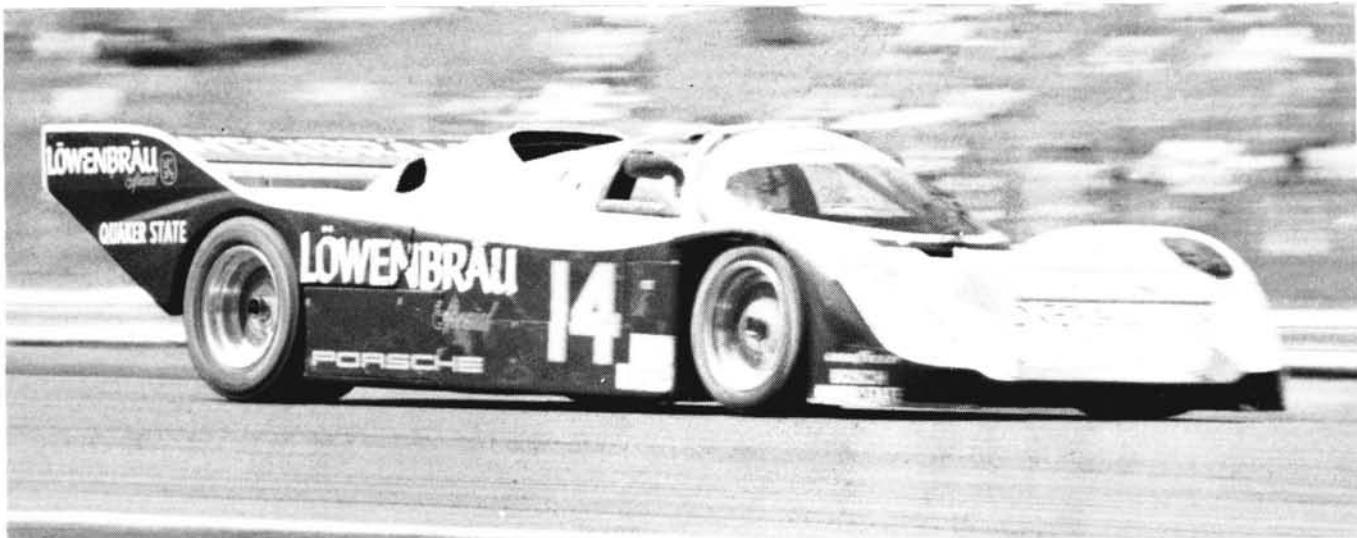
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The Pole Position

by RICH HEMSTREET



Porsche 956/962 has been the most dominant GTP racer for several years, but not anymore. (Photo by Dan Pusateri.)

DURING THE PAST TWO years, there has been a major shake-up in full-scale IMSA GTP racing. For several years, the only competitive GTP race car was the Porsche 956/962, but that changed when Jaguar decided to be serious about GT racing in the U.S. Porsche had already beaten down challenges from Chevrolet's Corvette GTP and Ford's ill-fated Probe effort. Jaguar even scored a couple of victories while they developed their racing program. In 1988, they were ready to go head-to-head with Porsche. The Castrol-sponsored Jaguar team won the 24 Hours of Daytona to open the IMSA season, but the Porsche team managed to win the second IMSA race of the season at Miami. After the annual 12 Hours of Sebring, Jaguar was back on top again.

The fourth race of the season brought a surprise to both the Jaguar and Porsche teams, as the Nissan GTP won at Road Atlanta. Consequently, the Jaguar/Porsche battle became academic as the Nissan team suddenly rose to dominate IMSA. With Geoff Brabham behind the wheel of their GTP racer, Nissan won the next seven races.

All the important cars in IMSA GTP racing are now available for $\frac{1}{10}$ -scale R/C racing. McAllister* Racing produces both the Jaguar GTP and the Nissan. During the summer of '88, both bodies were raced head-to-head against the ever-present Can-Am TOJ bodies in Tulsa, OK, at the first ROAR $\frac{1}{10}$ -scale On Road Nationals. Very few drivers used the GTP bodies, but those who did



Chevy tried to beat Porsche with their Corvette GTP, but they haven't been competitive. MRP produces the Corvette GTP for R/C racing.

weren't hindered by them on the high-speed road course. In fact, Jim Rose finished in 3rd place in the Stock A-Main using the Nissan body. I think that GT bodies have a poor reputation among most on-road R/C racers, and this is undeserved. Can-Am cars were state-of-the-art full-scale race cars several years



Before the big surprise, Jaguar was ready to blow Porsche off the track. Here's McAllister Racing's version of the Jag in $\frac{1}{10}$ scale.

back, but Porsche, Jaguar and Nissan have learned a lot about aerodynamics as they battled for the IMSA title. The GTP bodies designed for R/C racing don't just look up-to-date, but they also provide some of the benefits of advanced technology. So if you're looking for an advantage on race day, why not try a GTP body or two?

The IMSA, GTO, and SCCA TransAm series have the most spectacular body styles in full-scale racing, and most of these bodies are available in $\frac{1}{10}$ scale. I'm hoping to see these bodies used at some major R/C races in 1989. Most racing

(Continued on page 92)

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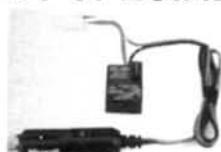
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POLE POSITION

events permit the stock and modified classes to use the same body styles, so it's difficult for spectators to understand that there really is a difference between these classes. If different bodies were used, the racing would be more interesting to watch, and as all spectators are potential future competitors, let's keep them interested.



The big surprise in '88 road racing was Nissan's eight straight wins. McAllister's Nissan was the top finishing GTP body at the ROAR Nats.

The GTO/TA races feature Camaro, TransAm, Merkur XR4Ti, Corvettes, Ford Mustangs and T-Birds, as well as the new Chevy Beretta and a few Porsche 944s. Wouldn't it be great to see an A-Main line-up with each of these cars represented? We'd be able to take great photos at the races if the cars didn't all look the same. Let's take advantage of the many body styles that manufacturers have provided for us. At the same time, we may bring in some new competitors; they're always welcome.

Until next time, try to keep it shiny side up!

*Here is the address of the company mentioned in this article:

McAllister Racing, 2205 1st St. #107, Simi Valley, CA 93065. ■

4WD SHOOTOUT

(Continued from page 72)

combined with equally poor rear suspension, impedes the car's ability to track effectively. While on flat ground, the Avante handled considerably better—in fact, almost too well. Steering was ex-

tremely sensitive, and if you didn't concentrate on holding a line, the car quickly found a wall! In tight turns, this worked to our advantage, as the Avante made short work of the hairpins. The Avante didn't like the jumps. On smaller jumps, when traveling at a moderate speed, the Avante maintained a level attitude and landed squarely. However, on large whoops and table tops, the Avante faltered. As it crested the larger jumps, its tail made contact, and this often sent it over the top and flipped it over to land on its roof.

Ahead of the Avante, and a fraction of a second behind the second-place car, was the Yokomo C4. The fastest lap from the C4 was 13 seconds flat, and its average lap time was 14.29 seconds. The C4 was more predictable through the turns, but it tended to slide, and although this occasional sliding was controlled, the car often ended up in the loose stuff, and this cost it some time. To a lesser degree, the C4 also showed similar signs of trouble with the larger jumps. One maintenance concern focused on the exposed belts going to the differentials. In many other cases, an exposed belt usually spells doom, but the stock body and undercow formed a good seal around the chassis.

(Continued on page 96)

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4WD SHOOTOUT

(Continued from page 94)

and kept virtually all harmful dirt away from the belts. With a little TLC, the C4 could be a definite threat.

The Kyosho Turbo Optima Mid SE turned the second-fastest laps during our tests. The fastest lap registered 12.94 seconds, and its average was 13.83 seconds. With good acceleration and cornering ability, we were able to turn the most consistent laps with the Mid. The

fastest lap was only .16 second faster than that of the C4, but as we could put the car on the track exactly where we wanted it, we increased our margin in average lap times. With only an occasional nose to the ground, the Mid soaked up the jumps much more smoothly than its competitors. One thing that may be hurting the Mid SE is the use of Platinum shocks. We've never seen a Gold shock (or others like them) break during even the most parts-jarring collision. The reason for the larger piston isn't clear to us. The pistons in the Platinum shocks are so large that when they're compressed, the oil displaced by the rod exceeds the volume of the rubber diaphragm gasket, so some air must be left in the shock to prevent hydraulic lock. Because the underside of the Mid body is open, you must keep a close eye on the electronics and other components, as they might become fouled with dirt. Other than the comment that there's no belt-tension adjustment, there's nothing else to say about the Mid, but you may want to watch your tail if you don't run one.

Turning in the best performance during our testing was the formidable Schumacher Cat. A couple of fast lap times registered below the 12.5-second mark, and the rest were in the low-to-mid 13-

(Continued on page 102)

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IO THE NAMES Bad to the Bone, Thriller, Nightmare and Brute Force give you an idea of what went on during the Summer Nationals Truck Pull? Over 30 monster trucks used brute force in their tug of war with the pulling sled.

The Mid Michigan Monster Truck Pulling Association held this event at the annual Bay City County Fair. These colorful monster trucks drew many spectators away



*Left: Matt Stagray's Ironhorse 2 carried the Stars and Stripes as it captured first place.
Above: Show Time had full pulls at both the 39- and 53-pound levels.*

SUMMER NATIONALS TRUCK PULL

by RICH HEMSTREET

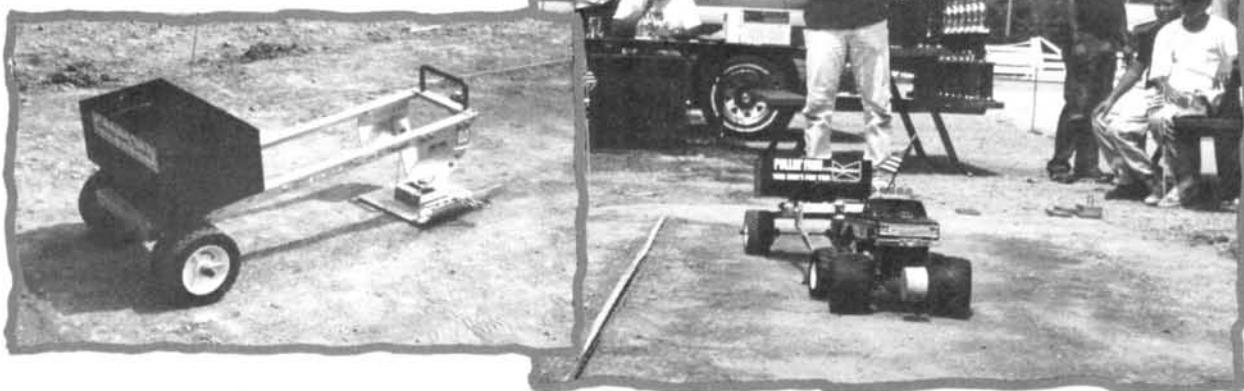


from other fair exhibits. (I wonder if their names helped?)

The trucks were divided into classes according to motor, power, whether 2WD or 4WD, and alterations. The dirt pulling track was five feet wide by 20 feet long, and points were awarded for each inch the sled was pulled. (A full pull was worth 240 points to the driver.) In an attempt to accumulate the most points in his class, each driver made three pulls, one in each

round. More weight was added to the sled in each successive round. While some pulling groups don't like to emphasize the total amount of weight pulled, the Mid Michigan Association was proud to show off its capabilities. The scratch-built

Below: Mid Michigan's home-built sled weighs 11 pounds empty and is geared for 20-foot full pulls.
Right: Tim Dunham tries to keep Lil' Red Express headed for the finish line.



sled weighs 11 pounds, and the lowest class—2WD Stock Trucks—pulled 14 pounds in the first round. That weight was increased to 20 pounds in the second round and to 25 pounds in the final pull. By comparison, Curt Walenty's Brute Force pulled in the 2WD Unlimited Class with a 25-pound first run. That weight increased to 39 pounds and 52 pounds in the next two pulls. Tom Siterlit's Exhibition Class Show Time started at 39 pounds and completed its final pull chained to 74 pounds.

The keys to this kind of R/C pulling ability are weight and power. There are no maximum vehicle weights in any Mid Michigan class, but the Stock Classes are limited to \$28 ROAR motors and a 7-cell battery pack. Two 7-cell packs and an \$80 motor are permitted

in the Modified Classes, while Unlimited and Exhibition Classes are permitted an unlimited number of battery packs.

On the day of the competition, one entrant didn't add any weight to his stock 2WD monster truck. He sat at the line spinning his tires while the 14-pound sled stayed put. He came back later for another attempt with so much weight strapped under the body that his tires were almost flat while sitting on the line! This time, he did move the sled part of the way down the track. He proved the existence of a critical balance between weight and performance when he removed some of the weight before his 20-pound second pull and still put in a better effort than in the first round.

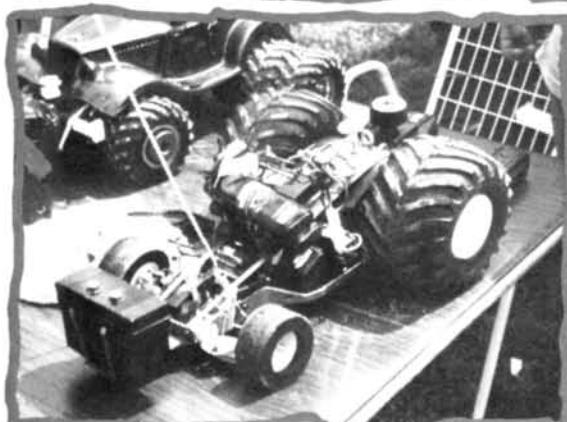
As you might imagine, several trucks failed mechanically when pushed to the limit. Gearboxes stripped and half-shaft failures were very common. Johnny Porter had to switch to his back-up NightMare when the gearbox on his first truck self-destructed. Porter still managed to take home a first-place trophy.

Part of the attraction of all monster trucks—full-size and R/C—are the nicknames they have. Big Foot started it in the full-scale monsters, and the Mid Michigan Association demands that every truck has a name. As well as those already mentioned, The Beast, Blue Ox, Must Go, and Blue Thunder were there, too. (Most had fancy paint jobs with their names lettered on.)

In the 2WD Stock Truck Class, Steve Damore drove Baba to victory over Dustan Sowulewski's Dust Bug. Scott Nieman's RC10, Taiter Masher, was victorious in the 2WD Modified Class. Bob Short came in



Steven Cole's scratch-built Lil' Monster is designed to carry more than 30 pounds of ballast.



Brute Force, an RC10, weighed in at 27 pounds and used four battery packs (28.8 volts) to win the 2WD Unlimited Class.

**The Mid Michigan Monster Truck Pulling Association
Summer Nationals Winners**

Class	Name	Truck	Chassis
2WD Stock Trucks	Steve Damore	Baba	Big Brute
2WD Modified	Scott Nieman	Taiter Masher	RC10
4WD Stock Trucks	Dan Toporski	Must Go	Grizzly
4WD Modified Trucks	Johnny Porter	NightMare	Grizzly
4WD Super Stock Trucks	Matt Stagray	Ironhorse #2	Clodbuster
4WD Supermodified Trucks	Dan Sparks	Thriller	Clodbuster
2WD Unlimited	Curt Walenty	Brute Force	RC10
Exhibition	Tom Siterlit	Show Time	Scratch



2nd with Tug-A-War, and Must Go carried Dan Toporski to 1st in 4WD Stock, while Porter's NightMare Grizzly won the 4WD Modified title. Both the 4WD Superstock and the Supermodified Classes were won by Clodbusters. Matt Stagray's Ironhorse 2 won SS, while Thriller pulled Dan Sparks to 1st in Supermod. Walenty's



Top: Must Go did go and win at Bay City. This Grizzly won the 4WD Stock Truck Class.

Middle: Show Time is half way down the track as the weight continues to the front of the sled.

Bottom: Six spare battery packs were used to keep this Bruiser's front tires digging up the track.

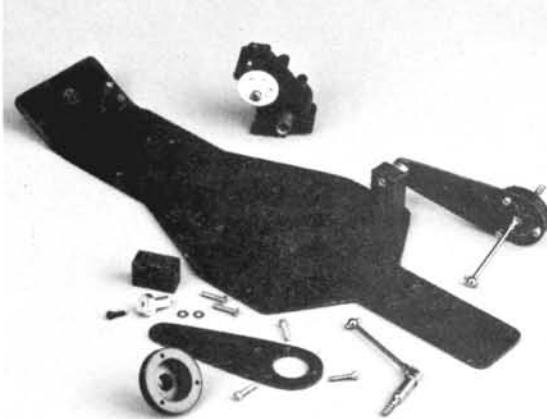


RC10, Brute Force, won the 2WD Unlimited title, and Tom Siterlit took the Exhibition crown with Show Time as Harry Waltz came in 2nd driving Bad to the Bone.

The county fair organizers were so impressed with the R/C truck pulling that they plan to hold the second Annual Summer Nationals in front of the main grandstands. You can bet that Blue Ox and The Beast will be there at show time! Any prizes for names?!

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4WD SHOOTOUT

(Continued from page 96)

second range. Almost every aspect of the way the Cat handles is to the driver's advantage. With proper diff adjustment (this has a nasty habit of readjusting itself!), cornering under power didn't yield the typical 4WD push, although the radius was tighter with a little less trigger finger. Air time for the Cat was equally successful, with straight, level flight. On occasion, a bad approach didn't exactly make for the best landing conditions, but the Cat made the best of it, coming down more smoothly than all the other cars, and all the while retaining the same compass heading. Don't take this wrong: By no means is the Cat invincible; in fact, the Cat is one of the most taxing cars to maintain and keep running consistently fast laps. But when it's hooked up, it's tough to beat.

When the dust finally settled, the Cat was clearly the victor when it came to bottom-line performance. When the car was dialed, the others couldn't match it, but, as any experienced Cat owner will tell you, keeping that Cat at the head of the pack is no easy task. The fine pitch of

(Continued on page 104)

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4WD SHOOTOUT

(Continued from page 102)

the teeth on the belt requires constant attention to prevent slipping, and, if the

belt covers aren't sealed to keep the belt and diffs clean, damage will result. There are fewer maintenance problems with the XLS than with the XL version, but there are still enough bugs to keep you on your

toes. If you're up to the job of wrenching the Cat, there's no doubt that you'll have a top performer.

In conclusion, these 4WD cars are all well-engineered, they run fast and handle well. However, in the final analysis, the Schumacher Cat came up holding the ace and outperformed the others. It's our 4WD Shootout victor. End of story!

*Here are the addresses of the companies mentioned in this article:

Schumacher, distributed by TRC, P.O. Box 478, Oakboro, NC 28129.

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Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

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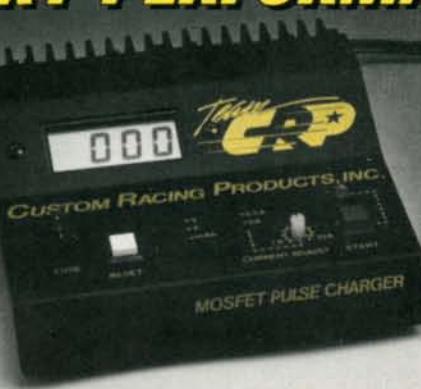
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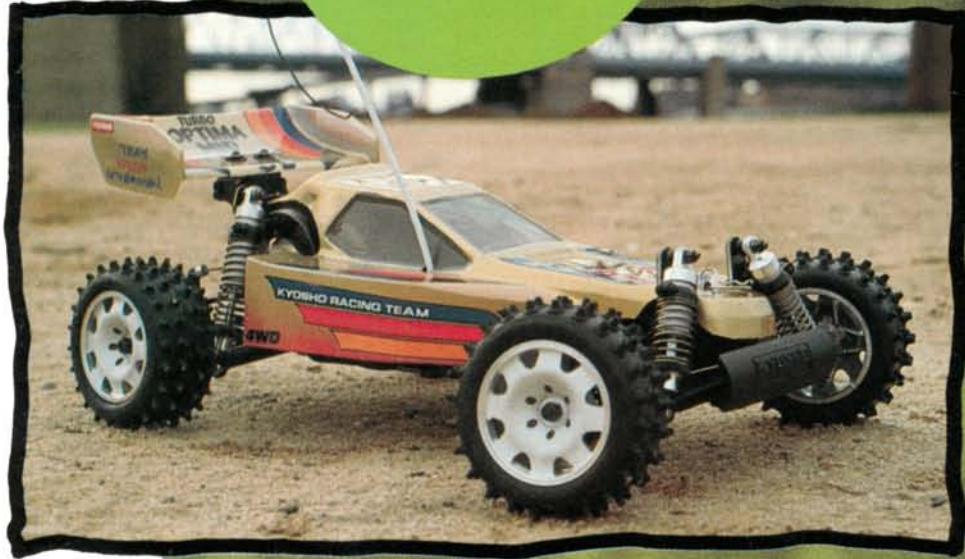
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OPTIMA MID^{SE}



by BILL O'BRIEN

If you've spent any time at all watching the activities of the folks at Kyosho*, you'll have realized that they don't rest on their laurels. Not satisfied with selling championship cars—the Ultima and the Optima—they've now re-shaped each vehicle into a world-class competitor, with the Optima undergoing the most radical changes.

Starting life as a rear-engine, 4WD chain-driven vehicle, the Optima first enjoyed a belt-drive conversion kit, which reduced the fric-

IA



tion and breakage of the chain system. Then, of course, it was "turbo-ized" with the addition of heavy-duty shocks, anti-sway bars and ball bearings. The Turbo Optima became a force to contend with.

Next came a reworking of the basic Optima design: The overall length was shortened by almost two inches as the engine was moved amidships (just forward of the rear axle) to improve the car's center of gravity. Along with the chassis mods

came an improved body design to enhance the car's aerodynamics.

This was the birth of the Optima Mid.

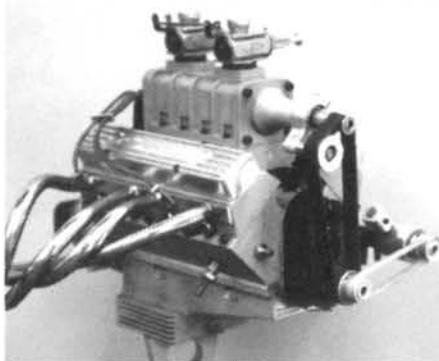
Even though it earned RCCA's "Car of the Year" award, I still had some doubts about this early Optima Mid. The assembly manual seemed to lack the attention to detail that such a complex car deserved, and construction took me a tortuous 21 hours. Performance was also an issue; while the Mid had great off-the-line acceleration, its performance fell very short of my expectations.

At that point, I had to make some modifications and, after adding bearings, a JG* lightweight chassis and radio plate, rear ball diff, and a front one-way diff, my Mid—christened "M" for modified—finally ran as well as I'd hoped it would. The only problem was cost, as even with mail-order prices, the mods panned out at just under

(Continued on page 111)

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BAJA BUGS

(Continued from page 43)

Our test drivers grinned broadly while sending the Bugs down the straights and jockeying for position through the turns in what appeared to be a giant arena. And 20 minutes later, the spectators hovered over the Ultima and Turbo Optima Baja Bugs with many questions.

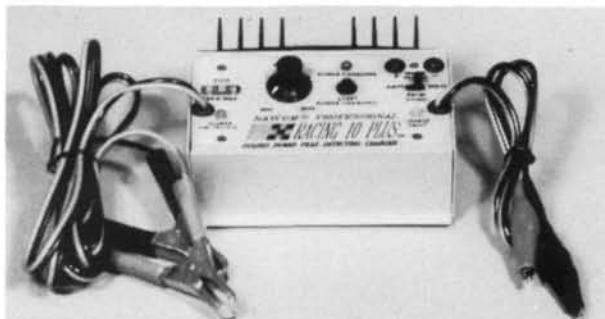
Everyone wanted to hold these palm-of-your-hand performers, and to take a close look at how much they resemble their big brothers in looks and downsized performance. But the biggest question remains: Where do they have races for them? I'll leave that up to your imagination, because that's all it takes to find a place for these hot little performers to do their thing.

*Here is the address of the manufacturer
featured in this article:

Kyosho; distributed by Great Planes Model
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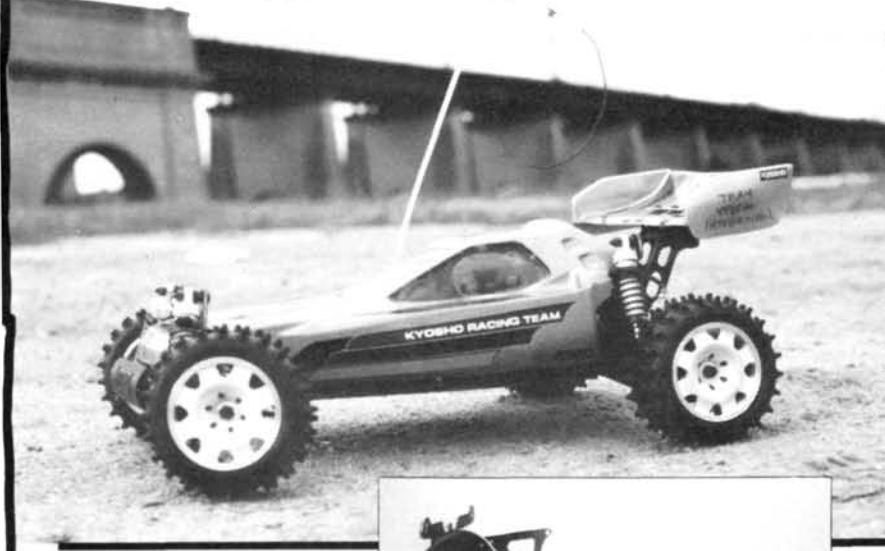
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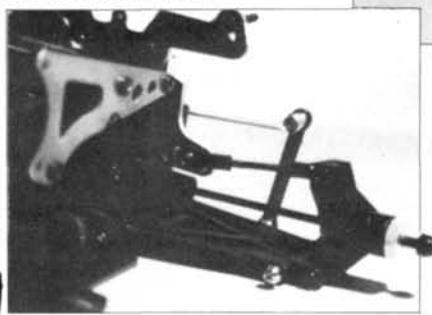
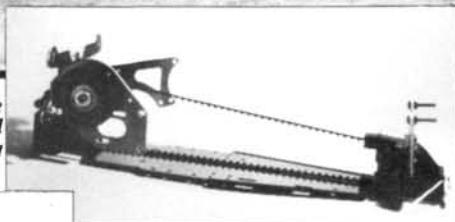
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Right: The drive mechanism for the Optima Mid SE consists of front and rear ball differentials tied together by a metal-reinforced belt.



(Continued from page 107)

\$200, making the Mid a \$400 car.

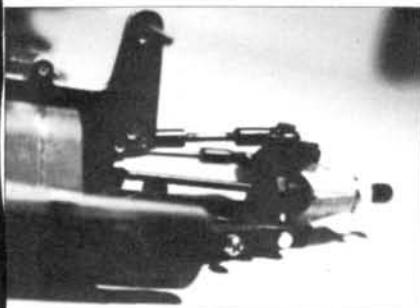
Kyosho did better. They waited until I'd finished and was happy with my rapid racer and then released the hyperactive Optima Mid—the Turbo Optima Mid SE. Not only did they pack it with more modifications than I'd managed, but they also did it at a lower price. When you buy it, you'll own one of the fastest stock 4WD cars sold in America today.

THE KIT: If you don't count the platinum shocks, the heavy-duty mechanical speed controller, the front and rear ball diffs, front and rear anti-sway bars and a bag of bearings, the most startling differ-

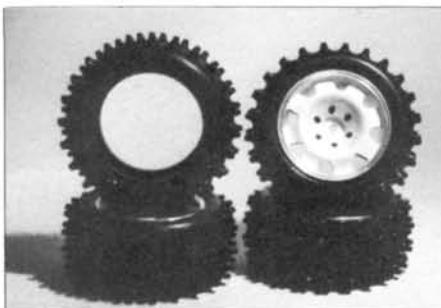
ence between the Mid and the Mid SE is the assembly manual. Gone is the montague of assembly instructions requesting mysterious screw sizes from a large collection of small bags. Gone is the tear-out section at the back where you needed to hunt for the location of the parts required. Everything is out in the open! This manual is more in tune with Kyosho's world-class car philosophy. If a 3x10 flat-head, self-tapping screw is required, a full-size picture of that screw appears right next to the assembly step. You just dig into the screw bag, pull out one that looks almost right, and lay it alongside the picture.

How much of a difference can an assembly manual make? A lot. The Mid SE took a mere 11 hours to assemble—almost half the time I needed to assemble

(Continued on page 136)



Improvements to the SE suspension over the standard Mid include front and rear anti-sway bar and soon-to-be-mounted platinum shocks.



The Mid SE features silver-plated wheels and the standard 12-spoke-per-inch tires Kyosho includes with most of its off-road buggies.

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Type 4WD Off-road race
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Overall Length 14 inches
Width 10.5 inches
Height 5.75 inches (without wing)
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Rear Track 9.5 inches

WEIGHT:
Gross 3.7 pounds (with radio gear and 6-cell battery)

Balance 47/53

BODY:
Type Single-seater buggy
Material Polycarbonate

CHASSIS:
Type Plate
Material Aluminum

DRIVE TRAIN:
Type Rear gear-drive with belt-front assist
Differentials Ball (f/r)

SUSPENSION:
Type (f/r) Lower A-arm with upper rod
Dampening (f/r) Oil-filled coil-over left and right

WHEELS:
Front: Type One-piece plastic
Dimensions 2 1/8 x 1 3/8 inches
Rear: Type One-piece plastic
Dimensions 2 1/8 x 1 3/8 inches

TIRES:
Front Spiked
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ELECTRICAL:
Motor LeMans 240ST
Speed Controller Kyosho HD mechanical 3 fwd/1 rev
Battery Type Required 6- or 7-cell (BEC radio required)

OPTIONS AS TESTED:

None

COMMENTS:

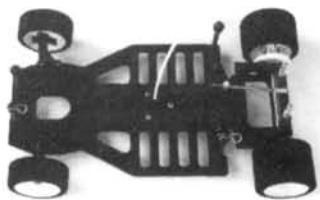
With the addition of bearings, ball differentials, platinum shocks and anti-sway bars, Kyosho has created a true competition-class Optima Mid. The overall construction is simplified by a revamped manual, but several assembly steps are still quite complex. If you're considering a Mid, we suggest the SE



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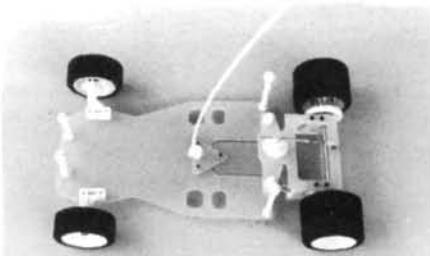
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BUDGET BATTLE

(Continued from page 56)

LeMans 05 Stock motor, used up power faster than the Boomerang with its Mabuchi 540 RS motor. In fact, the Boomerang ran for about another two minutes after the Shadow had dumped its battery. Both have very similar motors with sealed end bells, fixed timing and the same windings on the armature.

With the tests completed, we concluded that the Boomerang and the Shadow are both worthy of consideration by 4WD fans. Neither car broke down during our testing, so they were fairly well-matched. Because it's lighter and has a stronger 540 motor, I pick the Boomerang for faster times on an oval course and higher straight-line speed. But when it comes to the nitty-gritty of off-roading, the Shadow comes into its own. The Shadow's superior handling gives it an edge over the Boomerang when it comes to turning the wheel and making the jumps. As for building the kits, they're almost the same. The bottom line will always be the driver's skill. The best driver will emerge victorious, regardless of the car he drives. However, all skills being equal, there can

(Continued on page 116)

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BUDGET BATTLE

(Continued from page 114)

only be one winner in this shootout, and it comes down to one thing; off-roading. Here the Shadow wins.

*Here are the addresses of the manufacturers featured in this article:

Tamiya; distributed by MRC, 2500 Woodbridge Ave., Edison, NJ 08817.

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

2WD VS. 4WD

(Continued from page 83.)

require much wrenching to get them to handle acceptably. The independent rear suspension cars are usually the best way to get started. You could try a Tamiya Falcon or Sonic Fighter, Futaba* FX-10 or a Kyosho Raider for your first 2WD car.

Two important accessories should be installed on every beginner's car: a large, unbreakable front bumper and a set of ball bearings. If a suitable bumper isn't made for your car, figure out how to

(Continued on page 122)

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LOOKING DOWN THE BARRELS OF MRP'S LATEST OFF-ROAD WEAPON

by JOE BRUNI

SHOTGUN

AMIDST ALL THE debate about which *foreign* import will dominate the off-road championships arises a $\frac{1}{10}$ -scale 4WD racer that shows much promise and will perhaps be a force to contend with in the future—the Shotgun. Aside from its simple, yet advanced, design, the most important distinction between this machine and the competition is that it's made by MRP* (Model Racing Products) right here, in the good old USA.

THE KIT: There are two kits to choose from; both include a complete chassis with body and a full set of ball bearings. One kit includes a motor and a proportional resistor speed control with variable brake and forward, and the other allows you to choose your own. I chose the latter. The well-packaged kit includes an assembly manual containing 12 pages of step-by-step, easy-to-follow construction diagrams, written instructions, and a set-up section to help you dial-in the Shotgun to your local track.

Out of the box, the Shotgun has all the equipment necessary to race competitively in either a Stock or Modified 4WD class. (This depends on which motor you choose.) Some of the special features include: an anodized T-6 aircraft-aluminum chassis; three oil-filled, internally pressurized, hydraulized shocks; four-wheel, double-wishbone suspension; a tempered-steel drive shaft; 17 ball bearings; Super Tuff 101 nylon parts; totally adjustable front and rear ball diffs; an adjustable in-line slipper-clutch mechanism; and a fiberglass radio tray. Most important,



The new, sleek, Shotgun has promising features and welcome simplicity. The huge front bumper gives good front-suspension protection.

the Shotgun has only six gears in its power train; this translates into lower friction drag and fewer maintenance problems, and it also reduces weight.

CONSTRUCTION: Assembly was relatively easy and took only about five hours. The hardware legend, which lists all the parts diagrammatically, is a tremendous aid when you're not sure if you've chosen the proper screw or nut, as it allows you to match the part to the legend.

Construction begins with the most difficult part—the front and rear ball differentials. Two of the six power-train gears are utilized in the diff assembly. After carefully placing the 14 hardened-steel balls, simple adjustment follows. When racing the Shotgun, I noticed one discrepancy: When assembling the diff, the manual says you should tighten the diff screw a quarter-turn for proper diff function, but I think you'll need another quarter-turn to avoid excess slippage.

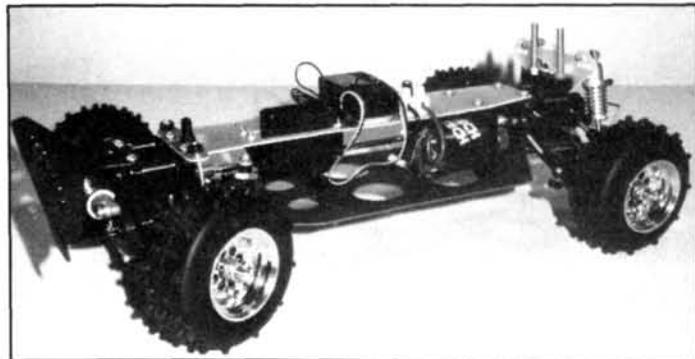
Next comes slipper-clutch assembly—a unique clutch design that's both functional and totally adjustable and located in-line on the main power train. The clutch comprises a spur gear (sandwiched between two hardened-steel washers), eight steel balls and an easy-access slipper gear. This slipper-clutch assembly is connected directly to the drive shaft and rear differential system. In seconds, the slipper clutch can also be easily adjusted at the track with two wrenches!

The front and rear gearbox assemblies come next. The quality and fit of the nylon gear-case halves were far superior to those of the standard plastic cases on most kits.

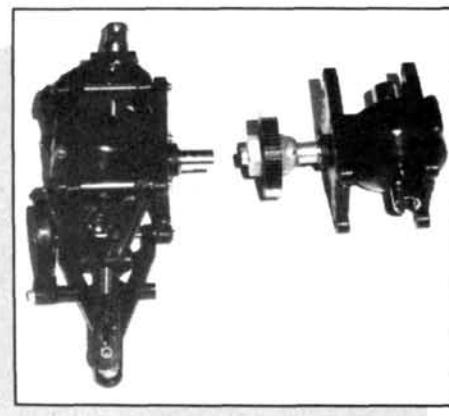
As previously mentioned, the Shotgun features a double-wishbone, four-wheel independent-suspension system. Each of the two gearbox assemblies has four A-arms (two upper and two lower) that are connected by four pivot pins. Because the nylon parts are injection-molded, expect some excess nylon over the holes (in this case, pivot-pin holes). Just drill out the surplus nylon with a small drill bit, and this minor improvement will provide a smoother, more efficient motion at each pivot joint. Many of the joints have ball ends that snap to the vital suspension-adjustment arms. Here again, performance can be hindered if the range of motion is limited, but you can avoid this by applying Paragon's* Ultralon. Ultralon is a liquid that dries to form a lubricating coat over any moving joint surfaces, and, best of all, it's guaranteed not to attract dust.

Chassis assembly is accomplished by simply adding both diff systems, drive shaft and slipper-clutch apparatus to the aluminum chassis plate. When constructing the three shocks, pay close attention to the written part of the assembly instructions, because it includes several performance tips, e.g., drilling holes in the dampening ports. (These may be missed if you just follow the diagrams.) The kit offers two types of spring tensions: progressive and non-progressive. Base your choice on

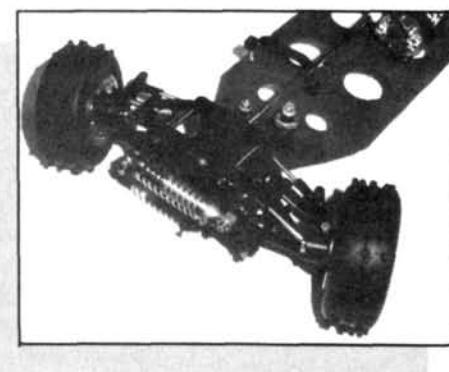
the typical track conditions that your car will encounter. I chose non-progressive for my local track, because the course is fairly



The finished Shotgun is simple and durable. The main components are a low aluminum plate and upper fiberglass radio tray.



On the left, front diff box with upper and lower A-arms attached. On the right, rear diff (A-arms not yet attached) with spur gear and integral slipper clutch.



Completed front suspension; travel is good and features adjustable down stops (see text). This will be one to watch in '89.

flat with few jumps, so I don't need the more forceful landing recoil provided by the progressive springs.

Wheel assembly is straightforward, as MRP has designed a three-piece wheel that sandwiches each high-quality spiked-rubber racing tire to prevent any loss of power caused by the wheel slipping on the rim.

Only the steering mechanism needs improvement; it simply doesn't match the technical ingenuity of the rest of the kit. There are too many mechanical parts, and no matter how much "breaking-in" I tried, the movement remained stiff, and it required a great deal of torque output by the front servo to turn the front wheels.

MRP precuts the radio tray to accommodate the steering servo but not the throttle servo, and this allows you to install a servo and mechanical speed control, or, as I chose, an electronic speed control. There are many new speed controls, and I opted for the Dialed Racing Products* (DRP) electronic speed controller. DRP makes three models: a 306 amp, a 180 amp and a 204 amp (with reverse)—all IR MOSFET configured. As I wanted maximum performance and power output, I installed the 306, which fit snugly behind the receiver. Unlike those of some other electronic speed controllers, DRP's installation and adjustment instructions are easily understood, and if the speed controller breaks, DRP will repair it for a minimal charge.

For power, I chose the Revtech* 4181 Contest modified motor, as it's reputed to be extremely fast and an excellent choice

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Type 4WD
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DIMENSIONS:

Overall Length 16 inches
Width 9½ inches
Height 5 inches
Wheelbase 10½ inches
Front Track 8¼ inches
Rear Track 8 inches

WEIGHT:

Gross (w/ battery) 3 pounds, 6 ounces

BODY:

Type Non-scale aerodynamic buggy
Material Clear polycarbonate

CHASSIS:

Type T-6 aluminum; One-piece; flat
Material Aluminum

DRIVE TRAIN:

Type (prim./sec.) Slipper clutch/shaft
Differential Bevel gear

SUSPENSION:

Type (f/r) Double wishbone
Dampening (f/r) Spring/oil

WHEELS:

Type (f/r) Spike/rubber
Dimensions (D/W) (f/r) 3½x1½ inches

TIRES:

Front Rubber/spike
Rear Rubber/spike

ELECTRICS:

Motor Revtech
Speed Controller Dialed Racing Products IR MOSFET 306 amp
Battery Type Required 6- or 7-cell flat or humpback

OPTIONS AS TESTED:

Kyosho Pulsar 2001 pistol-grip two-channel radio, Revtech modified motor, Dialed Racing Products IR speed controller.

COMMENTS:

The Shotgun offers a new challenge to the foreign-dominated 4WD class. The car is extremely light, very agile, and all necessary adjustment sites are easily accessible. MRP needs to improve the steering mechanism.

for competitive 4WD race buggies.

I painted the clear Lexan body with Pactra* yellow as a base color, and I used Eric Goldschrafe's MonoKote trim-sheet technique for custom detailing, as he's the master of detail. With this technique, you can create any imaginable design simply by cutting MonoKote.

PERFORMANCE: On arriving at any track, pay close attention to the track's surface. Is the surface hard or loose? Are there many jumps and curves? With this vital information, you can usually predict the type of setup adjustments you must make. With any high-tech race car, dialing-in the car for optimal performance during any race requires skill, accuracy and a great deal of patience. MRP's easy-access design allows very quick trackside adjustments.

The Shotgun has three crucial drivetrain adjustments: the front and rear diffs and the slipper clutch. These were crudely adjusted at the time of construction. My usual track ritual is to place the car on the surface of the track to check for proper toe-in or toe-out; then I switch on the radio gear and make a final radio adjustment check.

Finally, it was time to put the 'Gun on the track and raise hell. My first lap was extremely tentative—almost at a crawling pace. After a few serpentine turns, I headed for the long straightaway. Just at the crest of the final turn, I aimed the car down the track and pulled the trigger. The Revtech motor screamed, but the car accelerated very slowly. I immediately realized that the slipper clutch was set too loose, so instead of wasting the fresh battery pack, I slowly wheeled into the pits, took off the body and quickly tightened the slipper gear.

My next laps were less hesitant—to say the least! The Shotgun left the starting line like a rocket and powered down the first stretch, throwing up dirt from each of its spiked tires. It gracefully entered the first turns, commanding its way through with no power loss. In fact, there was too much traction on the front tires, and I wanted the car to slide more than it did, so I again entered the pits for an attitude adjustment. I dropped the front right half-shaft and, using one of the many Allen-head

(Continued on page 128)

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2WD VS. 4WD

(Continued from page 116)

make another one fit. All cars risk expensive front-suspension damage when they have a bumper that's too small. A broken race car is no fun! Ball bearings are easily the most important hop-up item a racer can install. They'll not only make your off-road car faster, they'll also increase the car's run time and its life expectancy. The plastic bushings included in many off-road kits wear very quickly, and this causes a poor fit, especially in the gearbox. Extra slop in the gearbox robs you of power and wears out related parts. If a full bearing set is too expensive when you first build your new car, at least buy the ball bearings that fit inside the gearbox. This will give you a much more efficient gearbox and will also save you a great deal of disassembly work when you install ball bearings later. If manufacturers sold ball-bearing sets to fit the gearboxes, it would greatly benefit new R/C drivers. The bushings in the hubs and wheels can easily be replaced at a later without much work.

Finally: If you want an R/C car that will beat your buddy's, why not get a car

(Continued on page 124)

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2WD VS. 4WD

(Continued from page 122)

identical to his? You won't have to worry about the 2WD versus 4WD debate, and, best of all, when you beat him, you can't be accused of having an "unfair advantage."

*Here are the addresses of the companies mentioned in this article:

MRP, 18676 142nd Ave. NE, Woodinville, WA 98072.

Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Kyosho; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Tamiya; distributed by MRC, 2500 Woodbridge Ave., Edison, NJ 08817.

Futaba Industries, 555 W. Victoria St., Compton, CA 90220.

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SHOTGUN

(Continued from page 120)

wrenches included in the kit, I decreased the diff tension. This enabled the rear diff to provide more power, while the front

diff provided less. This increased understeer.

I used a new 6-cell matched Sanyo* 1200 SCR Ni-Cd battery pack that had been peak-charged on a new MRP Digicharger. This new DC charger features a digital volt/amp meter, a 15-minute timer, fuse protection, charge/discharge capabilities and, best of all, an automatic trickle-charge.

Now this baby was dialed-in, and it was time to try jumping. The shocks were set moderately stiff to avoid bottoming out while landing, and the Shotgun performed extremely well on small and medium jumps, landing each time on all fours. I noticed some clutch slippage after high jumps, but there wasn't any noticeable loss of power.

Discounting the stiff steering mechanism, I applaud MRP for this new threat to the competitive $\frac{1}{10}$ -scale 4WD class. The Shotgun's design is simple and easy to work on, and the car weighs only 3 pounds, 6 ounces with a battery pack. But will the 'Gun hold up under extended race conditions? If so, I think we'll see an American-born champion at the Off-

(Continued on page 131)

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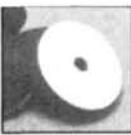
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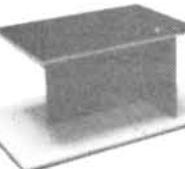
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SHOTGUN

(Continued from page 128)

Road Championships this year. What's better for a "shootout" than a Shotgun?!

*Here are the addresses of the companies mentioned in this article:

MRP, 2500 Woodbridge Ave., Edison, NJ 08817.

Paragon Racing Products, 8802 Knollwood Dr., Eden Praire, MN 55344.

Dialed Racing Products, 475 W. Hamilton, Suite 225, Campbell, CA 95008.

Revtech R/C Products, 7401 White Lane, #19, Bakersfield, CA 93309.

Pactra, 410 N. Michigan Ave., Rm. 1280, Chicago, IL 60611.

Sanyo Electric, 200 Riser Rd., Little Ferry, NJ 07643.



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RODENT REVIVAL

(Continued from page 71)

and it doesn't leave anything to be desired! The car accelerates quickly on just seven cells, but if more power is needed, you just add more. (There's plenty of room in this chassis for any combination of Ni-Cds.)

Up front, there's an Advance Pro Stock steering assembly that's worked by a Futaba* servo, which is taped to the

fiberglass. The receiver is mounted in front of the servo, and the PDI* Drag Zeta is attached to the servo with Velcro so that the main part of the chassis pan is kept free for batteries. The wheels are Advance Street Machine units, dyed to match the car, and the sponge slicks and front tires are also from Advance. The body is mounted with a set of BoLINK* nylon mounts, also dyed to match.

Anyone who has drag-raced an elec-

tric car knows how much room you need to stop one of these radical machines, especially with a bunch of batteries in it. It's a real handful, too, because the weight isn't distributed in a way that helps in straight stops! Since this beast uses an electronic speed control with very little braking action, I added something the real dragsters use—a parachute! This isn't as complicated as it might seem, and it's

(Continued on page 134)



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ULTRA



WARRIOR

RODENT REVIVAL

(Continued from page 132)

easy to operate. So that I could plug the speed control and a servo into the same socket in the receiver, I made a Y cable. When the speed control is operated in the usual way, the servo runs in one direction and doesn't affect anything, but when you pull the lever (or trigger) into the brake position, the servo goes the other way and pulls a pin out of the parachute pack above the rear bumper. An Estes model rocket chute deploys its kite-string

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While it has only had a few shakedown runs to check out its performance and the parachute system, the Rug Rat II looks like a real winner. I'll let you know in the

next couple of issues: Some serious match racing is in store for you drag-racing fans. I'm not talking ho-hum stuff; there's going to be some real tire-smokin', wheel-standing, full-bore racing action with some great cars!

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(Continued on page 136)

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RODENT REVIVAL

(Continued from page 134)

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OPTIMA SE

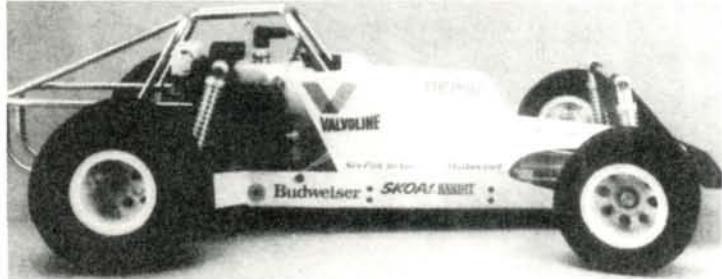
(Continued from page 111)

the original Mid. And I'm now at the point where I can pluck a 3x10 out of a mixed bag with one eye closed!

CONSTRUCTION: The new manual leaves almost nothing to the imagination, so construction is simplified and enjoyable. The differentials are pre-assembled, as are the platinum shocks, which need only shock oil to be complete. I'll just discuss the few stages where you might

(Continued on page 138)

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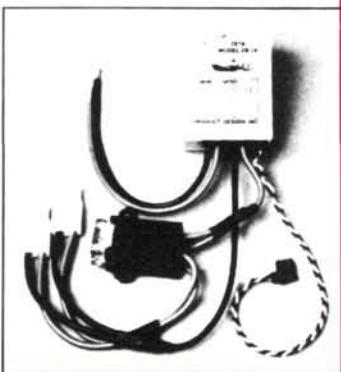
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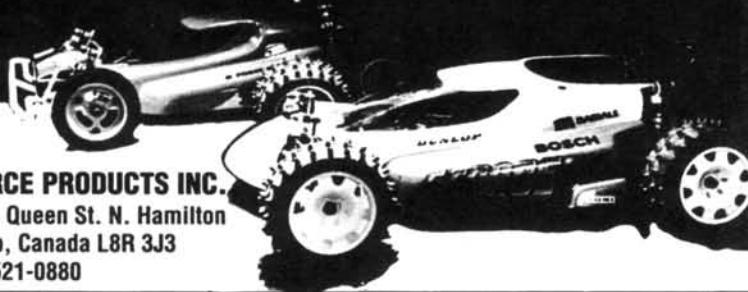


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OPTIMA SE

(Continued from page 136)

have problems.

The Mid uses a steel-reinforced belt to link front and rear differentials. With no tensioning or idler pulleys, the belt runs in a full loop along the lower chassis plate and then up across the top of the radio plate. To prevent dust and debris from entering the drive system, Kyosho has covered the belt with two polycarb protectors that run the full length of the chassis and radio plate. The covers aren't ready to install: You'll have to trim off some of the material to make the covers fit correctly, and Lexan scissors are invaluable.

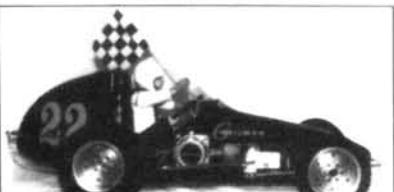
A short Lexan cover should be installed under the front of the radio plate, and it's almost impossible to do this with the radio plate bolted into place. If you leave off the front two screws, you can lift the radio plate up high enough to wiggle your finger under it while you align the lower cover and hold the nuts in place to finish the assembly.

The right rear A-arm is almost impossible to install with the radio plate bulkhead in place. While it's possible to spear the pivot shaft with an E-clip, if you have a

(Continued on page 140)

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OPTIMA SE

(Continued from page 138)

good eye and a steady hand, it might be simpler to deal with the confined access space by temporarily removing the bulkhead.

For some reason (I suspect it's to improve the front caster), the left front knuckle installs on the right front hub and the right front knuckle installs on the left front hub. The parts are all labeled in the manual and there's a small reminder, but it's easy to overlook, so be careful.

There's no wasted space on the Mid's chassis. Servos, rods, covers and shafts all fit compactly. A general rule of thumb is that you should use the smallest possible radio equipment. I usually use Aristocraft* 402X servos, but in the Mid, even Kyosho's slightly smaller KS-88 servos are a tight fit. A better choice might be a Futaba* 32H (G-connector) and either a Novak* or Tekin* receiver.

Finally, the gear cover won't fit unless you remove the right rear shock absorber from its upper mount. Avoid installing the right shock until after you've put on the

gear cover.

The rest are just the usual assembly steps. Threading the belt between the diffs isn't difficult. The front and rear gearboxes are easily installed on the lightweight chassis, the A-arms almost fall into place and, with the rod dimensions illustrated in the manual, steering and suspension are a snap.

PERFORMANCE: Sometimes I think I'm the only person in the world who doesn't live near an R/C racetrack. To make up for that deficiency, I usually

(Continued on page 146)

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OPTIMA SE

(Continued from page 140)

head for Randall's Island in New York City and use one of the softball infields. The ground is hard-packed clay with a top layer of loose powder. To get around the base path, a car needs not only speed, but also enough suspension to stick.

I brought my three Mids (stock, modified and SE), and my friend Charlie brought his Avante, which can outrun my

stock Mid with one wheel wedged. Our friend Bob wanted to humble us both, so he showed up with his Stinger MK II. Running an O.S.* CZ-R gas engine, the Stinger was the fastest $\frac{1}{10}$ -scale 4WD, so we ignored it for the rest of the afternoon.

As expected, the Avante, with its Adspec electronic speed controller and Tamiya's* Technigold motor, obliterated the stock Mid, which was powered by a LeMans 240ST. However, my Mid M-

series, left the Avante choking in the dust. Its Hurricane* motor easily overcame the Technigold, but handling was a nightmare on the hard surface. We run clockwise, and I usually pre-load the right side springs to limit suspension travel. The small-diameter Kyosho Gold shocks aren't forgiving if they're not set properly, and on a hard surface, the car gets "squirrely" if the pre-load is set incorrectly.

(Continued on page 152)

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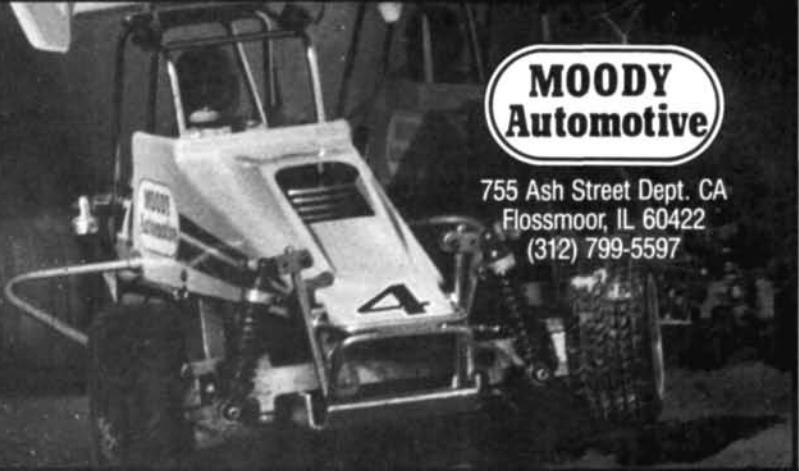
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OPTIMA SE

(Continued from page 146)

The small doubts I had about the Mid-SE and its 240ST against the Avante were quickly put to rest. Fast off the line, it opened and held a two-car-length lead. Cornering was a little difficult with the pre-load I'd set, but overall handling was excellent, thanks to the anti-sway bars and the forgiving nature of the larger-diameter platinum shocks. The car took to the road and held there!

Of course, jumps are part of racing as well, so we ran the Mid SE up one side of a four-foot pile of sand and let it fly off the top. It left the apex of the jump at a 15-degree angle, leveled after about 10 inches in the air, and then came down at 15 degrees on the other side. The balance of this car is phenomenal. (After the sixth or seventh jump, the left front tie rod dislocated from its ball link, but that was under abusive conditions.)

What's Next

Platform cars like the Mid, even extended to SE proportions, still leave room for improvement. Although it's a hundred times better than the older Kyosho "spot-welder special" models, the heavy-duty mechanical speed controller still gets clogged with dust, even though it's enclosed in its own plastic casing. Novak, Futaba or Tekin ESC could fit neatly in the Mid to control the electromotive force.

(Continued on page 160)

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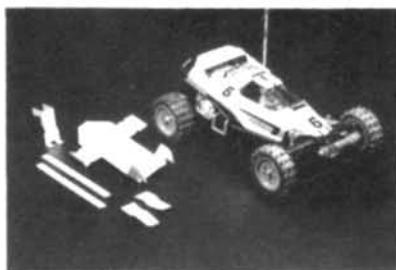
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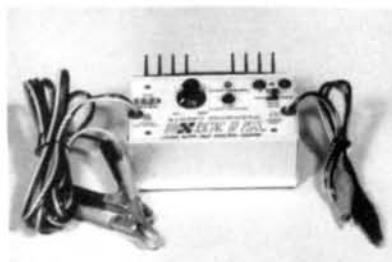
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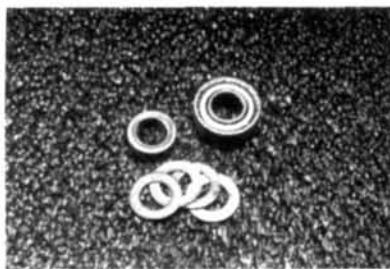
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For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.



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The Tekin BC 100 is a 2- to 9-amp, high-output peak-detection charger designed to extract maximum performance from all R/C car Ni-Cds. New types of Ni-Cd cells have required a new peak-detection circuit for the most accurate and reliable results, and the BC 100's new circuitry is 50 percent more sensitive and yet more accurate. The BC 100 also features a new slope-type case and a rugged, easy-to-set adjustment knob.

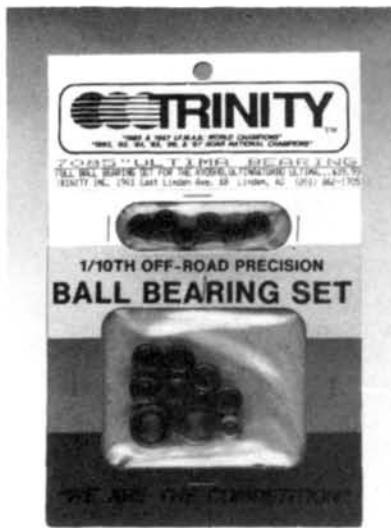
For more information, contact Tekin Electronics, 1027 Trepadora, San Clemente, CA 92672.



LITTLE ENGINES CLODBUSTER WHEELS

Little Engines introduces these one-piece aluminum wheels for the Tamiya Clodbuster. Machined from aircraft-quality aluminum by a CNC computer milling machine for the most precise tolerances, these wheels feature an attractive center-line-type hole pattern and a brilliant, brushed aluminum finish that's second to none. These wheels will adapt to the stock wheel mount without modification, and they're machined to the same dimensions as the stock wheel.

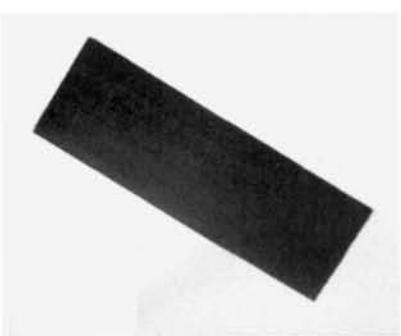
For more information, contact Little Engines, P.O. Box 7, Lomita, CA 90717. ■



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For more information, contact Trinity, 1901 E. Linden Ave. Unit 8, Linden, NJ 07036.



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For more information, contact Twinn-K, Inc., P.O. Box 31228, Indianapolis, IN 46231.

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OPTIMA SE

(Continued from page 152)

The 240ST is already history: It's been replaced by a Revolution* Insane motor. The LeMans engine is an inexpensive stock unit that will still give you nominal performance, but the stock suspension on the SE can handle the outrageous output of the Insane.

I'm looking forward to trying Kyosho's 16-tooth racing pinion. It's clutched to allow some slippage if the wheels jam;

however, I'm not sure how effectively it will perform with the SE's ball differentials.

While I'm changing speed controllers, I'll probably slip in a Tamiya EX 1700mAh battery. It's a tough choice between the Kyosho SCR, with its better voltage flow, and the EX SCE with its higher capacity. Usually, you'd want all of the amperage an SCR battery can provide, but once you've gone over to a higher-output motor and a smaller pinion gear, duration may become your main

concern.

The nicest thing about the SE is that you don't have to do anything to it! While I still have great respect for Tamiya's Avante, Kyosho's Turbo Optima Mid SE has recaptured the gold standard. If you're going to buy an Optima Mid, you might as well go for the SE. If you bought all these extras separately, they'd cost you a lot. Can you resist such a bargain?

*Here are the addresses of the manufacturers mentioned in this article:

(Continued on page 166)

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OPTIMA SE

(Continued from page 160)

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 Tekin, 1027 Trepadora, San Clemente, CA 92672.

O.S.; distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

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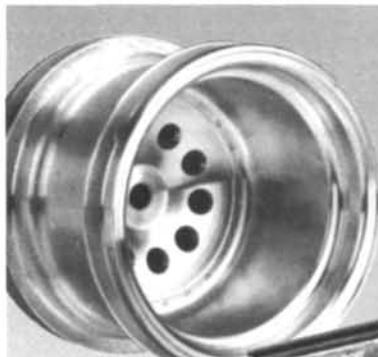
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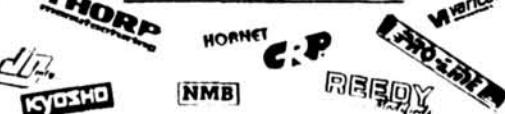
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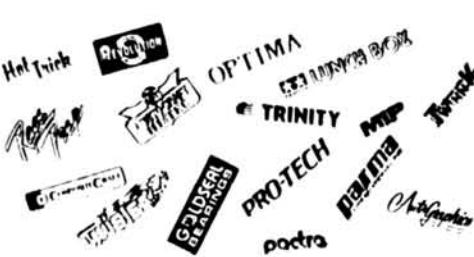
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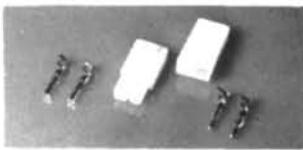
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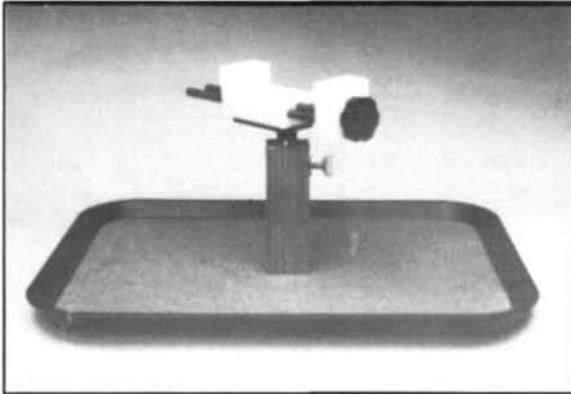
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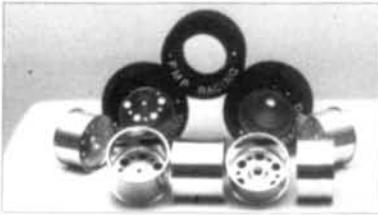
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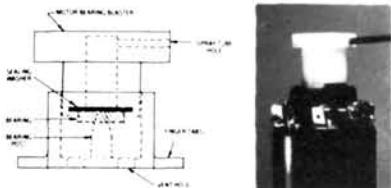
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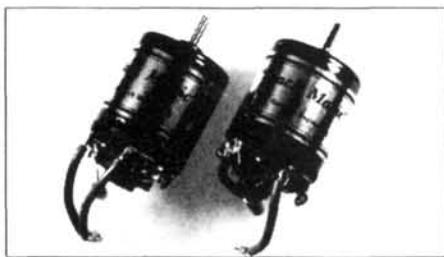
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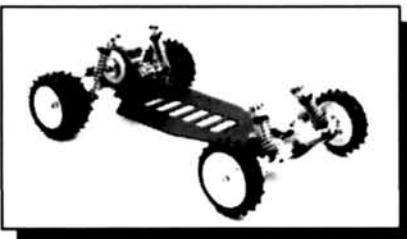
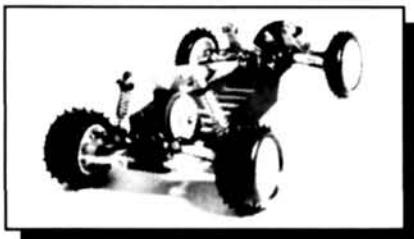
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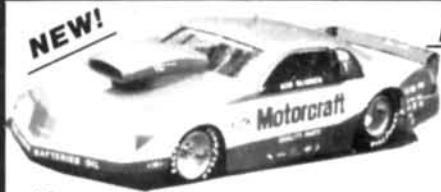
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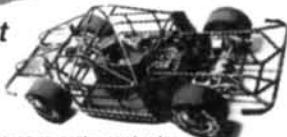
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3150 Brinker Ave., Ogden, 84403
(801) 392-9760

LOGAN R/C RACEWAY & HOBBIES
491 South Main St., Logan, 84321
David Barnhart (801) 752-3915

VIRGINIA

CHESAPEAKE R/C HOBBY SHOP & RACEWAY
7112B Hull St. Rd. (360 W. Sh. Cen.)

Richmond, 23225
(804) 276-5013

FAIRFAX RACEWAY

11340-F Franklin Farm Rd., Herndon, 22071
Eric Zelman: (703) 471-4499

B & H HOBBIES RACEWAY

Rt. 10, Box 178, Mechanicsville, 23111
(804) 746-2758

POOR BOY'S HOBBIES & RACEWAY

Rte. 6, Box 31, Mechanicsville, 23111
Allen, Nancy, or Rick (804) 746-5184

RICHMOND R/C RACE CLUB
6112 Hudswell Ln., Richmond, 23234
Ron Birkhead

WASHINGTON

R/C CAR CLUB OF SPOKANE

N. 1920 Sargent Rd., Spokane, 99212

Deanna Schram: (509) 928-0503

SEATTLE R/C AUTO RACERS

Tom O'Hara (206) 784-9656 or

Ed Hagan (206) 271-0461

TEAROR OFF-ROAD RACEWAY

8012 S. Tacoma Way, Tacoma, 98499

(206) 537-9437

S.W. WASHINGTON RACING ASSOC.
2220 Ocean Beach Hwy., Longview, 98632
Keith Salzseider (206) 577-8115

WISCONSIN

FOX VALLEY R/C OFF-ROAD RACING CLUB

Appleton, 54106

Tony Zuleger (414) 733-7771

THE TRAIN STOP RACEWAY

5612 Hwy. 51, Schofield, 54476

Kip Turner: (715) 359-9060

CUDAHY NEWS & HOBBY CENTER

4758 S. Packard Ave., Cudahy, 53110

(414) 769-1500

CLASSIC R/C SPEED SHOP & RACEWAY

N. 90 W. 16519 Roosevelt Dr., Menomonie Fall

53051 Joel Gish (414) 251-2000

MILWAUKEE R/C AUTO RACERS

Village Mall Shopping Center

Joel Gish (414) 251-2000

WEST END HOBBIES, INC.

144 North Main St., West Bend, 53095

Bill Villmow (414) 334-0487

In keeping with our constant efforts to help foster the growth of the radio-control car hobby, we've decided to run this track directory intermittently to inform modelers where they can race and exchange ideas. If you'd like your track listed, send us your name, address, phone number and some information about the track to **R/C Car Action Track Directory**, 251 Danbury Road, Wilton, CT 06897. We'll list as many clubs as space allows.